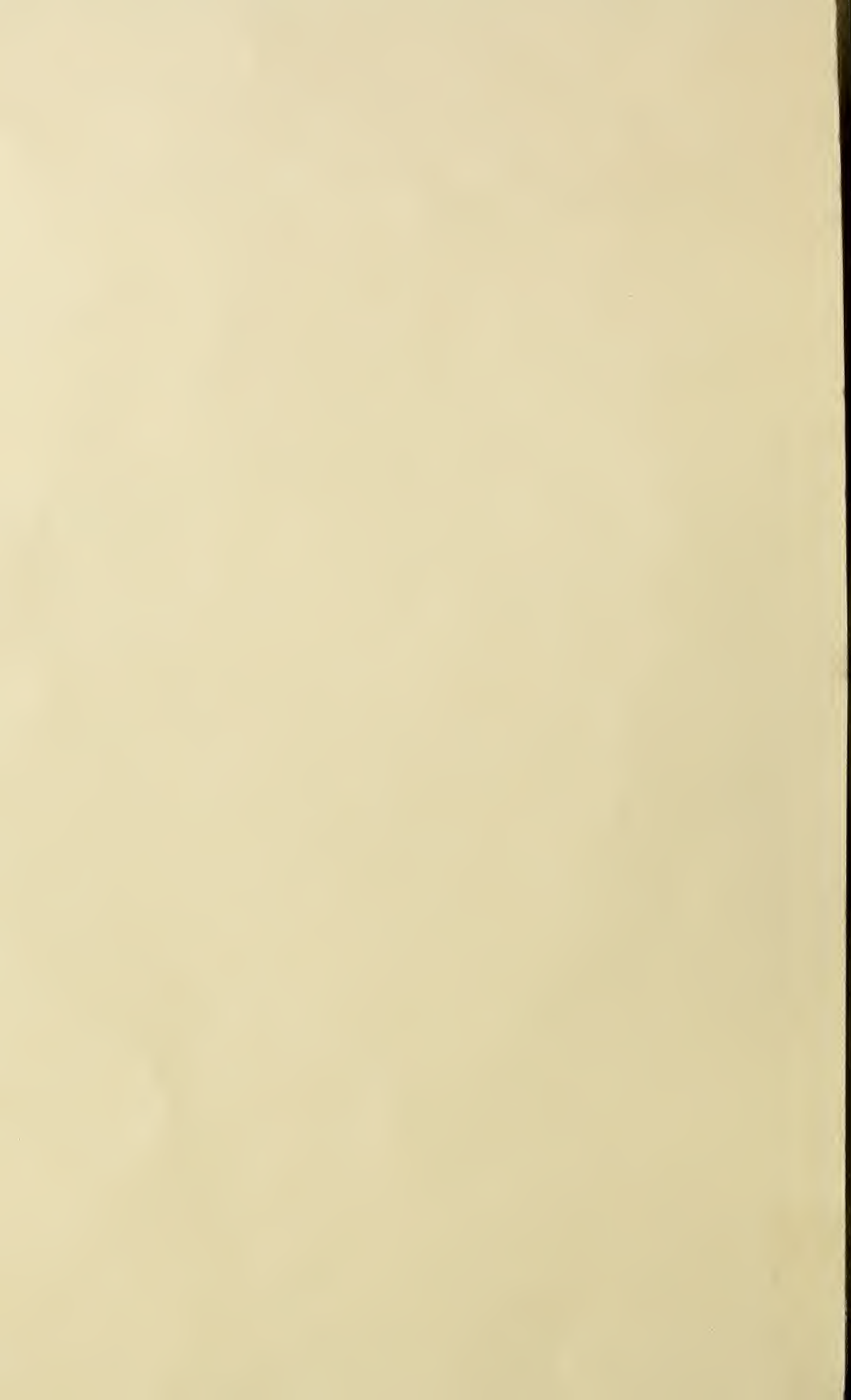


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THE AGRICULTURAL STUDENT

OHIO STATE UNIVERSITY, COLUMBUS, OHIO



APRIL, 1919
SOIL FERTILITY NUMBER

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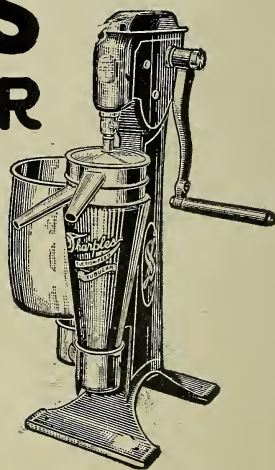
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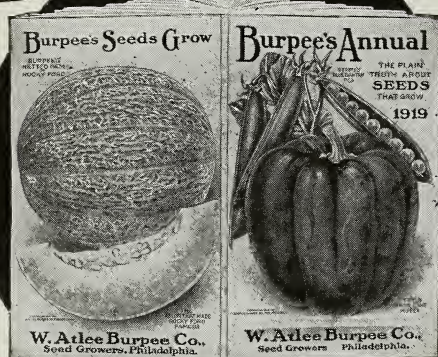
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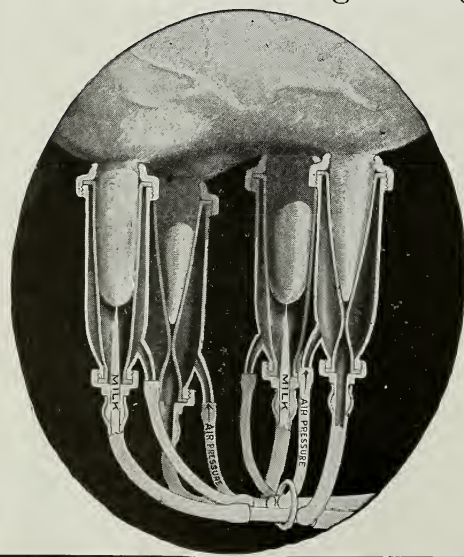
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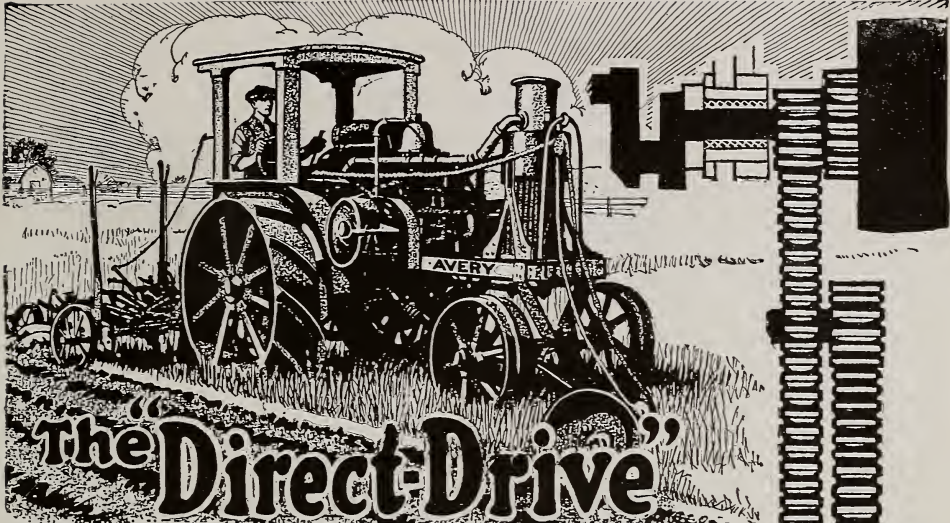


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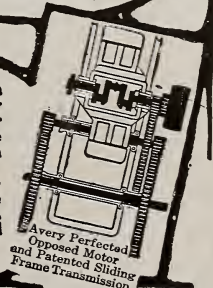
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RUSTIC BRIDGE OVER MIRROR LAKE

Ohio State University

The Agricultural Student

VOL. XXV.

OHIO STATE UNIVERSITY, COLUMBUS, OHIO, APRIL, 1919

No. 8

PAST, PRESENT, AND FUTURE OF OHIO AGRICULTURE

By FIRMEN E. BEAR

(Professor Bear gives some interesting facts and figures on agricultural tendencies in Ohio during the last forty years. "These tendencies point to the development of crop centers in the state," he says.)

IN studying the crop statistics of Ohio as gathered by assessors certain questions arise in one's mind relative to the causes underlying the distribution of these crops. Why, for example, should Ashtabula county produce 25 per cent of the buckwheat? What is responsible for the fact that 50 per cent of the tobacco is grown in Darke and Montgomery counties? What is the reason that Hardin county supplies 40 per cent of the onions? Why are Brown, Clermont, Clark and Highland counties producing so much rye? For what reason are Pickaway, Wayne, Ross and Greene the banner wheat counties?

Over three-fourths of the corn is produced in western Ohio, but 60 per cent of the ensilage corn grows in the northeastern corner of the state. Nearly 90 per cent of the oats is grown in the northern half of the state. One third of the clover is grown in northeastern Ohio with Wayne county outstanding. Lorain county leads in sweet clover, Champaign in alfalfa, Washington in soybeans and Pickaway in peas. Warren and Pickaway counties are heavy producers of sweetcorn. Wood county supplies nearly 30 per cent of the tomatoes with Hamilton a close second. Henry, Wood and Putnam counties lead in sugar beets. Over 99 per cent of

the total beet tonnage is grown in the northwestern quarter of the state.

According to statistics published by the Secretary of State certain tendencies in crop acreages are shown during the last forty years as indicated in

TABLE I.

Crop Acreages in Ohio During the Last Forty Years—In Thousands.

	1877- 1886	1887- 1896	1897- 1906	1907- 1916
Cultivated -----	8,936	10,065	10,137	9,331
Pasture -----	5,427	6,071	6,320	6,627
Woodland -----	4,753	3,525	2,794	2,078
Waste -----	567	474	640	769
Corn -----	2,774	2,785	3,057	2,973
Wheat -----	2,490	2,432	2,205	1,763
Oats -----	742	1,013	1,195	1,307
Rye -----	40	58	56	86
Barley -----	50	28	34	26
Potatoes -----	116	150	132	123
Buckwheat -----	14	12	11	15
Meadow -----	1,594	1,900	1,921	2,218
Clover -----	524	605	783	661
Orchards -----	423	383	319	273

There has been a decrease in the area of cultivated land and of forest. The acreage devoted to pasture and meadow has been increased. Corn, oats, rye and buckwheat show larger acreages as the years advance. Wheat, barley, potatoes and orchards are not grown so extensively as they once were. A gradual increase in clover has been followed by a decrease during the last decade.

A considerable part of these changes can be explained by the market demands and the relative selling prices of the crops. The labor problem is also involved, a scarcity of labor meaning more acres of pasture and meadow. The decrease in wheat acreage and the increase in rye acreage are related not only to price considerations but to soil conditions. The decrease in clover and the increase in the acreage of meadow and pasture are explained at least in considerable part by a study of the fertility problem. An increase in the area devoted to buckwheat is probably and indication of certain soil needs.

Some of these tendencies are obscured in the statistics for the whole state since the eastern and southern sections were already becoming fairly old agriculturally while the greater part of the northwestern corn of the state was virgin land, coming under cultivation largely during the last twenty-five years. Geological studies show that the better soils of the state are included in the newer agricultural sections. For every acre in the state that became less productive another better acre has been brought into cultivation from the forest.

Table II shows the fluctuations in acreages of several crops in six counties

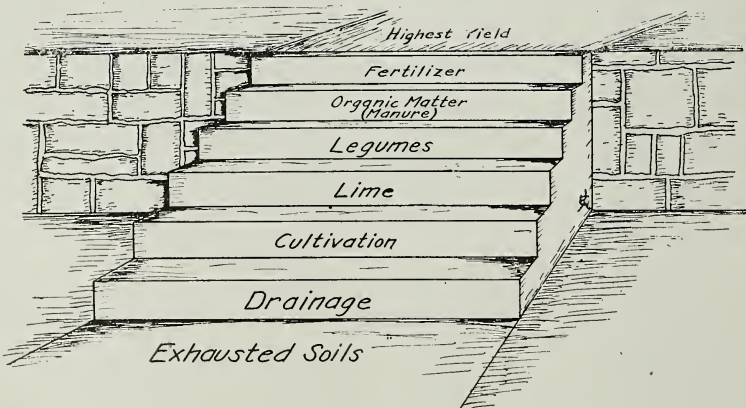
chosen to represent as many sections of the state.

TABLE II.

Acreages of Important Crops in Six Counties.

Ashtabula—	Corn	Oats	Wheat	Clover
1877-86 -----	14,325	18,152	15,808	2,224
1907-16 -----	14,360	25,442	6,435	2,028
Jefferson—				
1877-86 -----	15,030	10,140	18,670	1,980
1907-16 -----	10,060	8,710	9,270	3,420
Athens—				
1877-86 -----	17,510	3,005	14,140	564
1907-16 -----	12,510	1,620	6,580	1,017
Clermont—				
1877-86 -----	38,690	12,300	19,170	5,940
1907-16 -----	38,490	6,270	12,150	2,990
Wood—				
1877-86 -----	48,470	16,070	30,710	6,960
1907-16 -----	87,770	66,600	19,410	15,570
Delaware—				
1877-86 -----	35,360	5,670	25,100	4,800
1907-16 -----	38,870	11,500	16,940	810

It is very apparent that in many cases the acres growing corn in 1877 were growing other crops forty years later. While the total acreages devoted to corn do not fluctuate so much, yet during these periods certain counties were falling behind and others moving rapidly ahead in corn production. Wood county, somewhat typical of the northwest, practically doubled its acreage of corn and quadrupled its oats while Athens county, representative of the southeast, showed a decreased acreage of one-fourth in corn and one-half



in oats in four decades. In some cases oats is being substituted for wheat. On many farms rye takes its place. In other sections cultivated crop land is being put back into pasture.

Crop adaptations are beginning to play a most important part in their distribution. These adaptations are related to climatic and soil conditions but are disturbed by economic and labor factors. Furthermore men are slow to discard old crops and take up new ones. In time it can be expected that the several crops will have distribution which is more largely determined by the climate and soil. This will always be modified, of course, by the proximity to market, especially in areas not far removed from large cities. The acreage of market garden and canning crops can be expected to take up considerably larger areas of land as the population increases.

An English farmer, appearing before the committee appointed to investigate the agricultural conditions in the British Isles during the war said, among other things, that the good farmer in England expected a yield of from forty

to fifty bushels of wheat per acre. The highest yield of wheat exceeded eighty-eight bushels since at least several men had produced such crops. The average yield, however, was approximately thirty-two bushels, which represented roughly the lower limit beyond which the farmer could not go and produce wheat at a profit under English conditions. Only on those lands on which yields of thirty-two bushels or more per acre could be expected would wheat be grown.

In time the several crops will be grown in Ohio largely on those soils and under those climatic conditions which are most favorable to them. This will result in increasing the tendency in the direction of the formation of crop centers. These will be influenced from time to time by economic conditions related to increasing populations in the industrial centers. The development of transportation facilities will have a marked influence on this problem. Soil and climate will continue to play a very important part in determining where any given crop will be most extensively grown.

THE SOILS OF OHIO

By GUY W. CONREY

(Mr. Conrey is Ohio's soil survey expert. He is well qualified to give us this practical discussion of the soils of the state. He explains how the changes in crop acreages, referred to by Professor Bear in the preceding article, have been largely the result of a better adaptation of crops to soil conditions.)

OF the factors which determine the nature of the agriculture of any region, the character of the soil is of prime importance. So generally recognized is this that we often speak of corn soils, wheat soils, tobacco soils. Of equal and sometimes even greater importance is climate as expressed in rainfall, temperature, length of growing season and influence of large bodies of water. The desirability of crop rota-

tion, many times results in the production of crops which are not especially well adapted to the soil on which they are grown and sometimes not best adapted to the climatic conditions. Market conditions, as regards local demand, nearness to large cities, the presence of factories for canning and preserving have further modified the trend of agricultural production.

In Ohio the soil conditions are quite

varied. In the first place, the kind of rock from which the soils have been formed has resulted in marked differences. West of a line drawn thru Sandusky and Columbus the underlying rock for the most part is limestone, while to the east it is sandstone and shale.

Another cause for variation in soils is the fact that about three-fourths of the state, including western and northwestern Ohio, has been glaciated. As a result large areas were smoothed off, old valleys were filled up and in many places a gently rolling to almost level surface was developed. The soils of the glaciated region were produced by the grinding up of the local rocks along with some material carried by the ice from great distances. Because of the variations in rocks in the region covered, there were produced in western Ohio glacial limestone soils well supplied with lime, while in the northwestern part of the state where the rock was sandstone and shale the soils are lacking in lime.

Since the deposition of the glacial material by the ice marked changes have been brought about as a result of varying conditions of weathering, resulting largely from variations in topography and drainage. On the better drained areas brown soils have been produced, with fair drainage grey brown soils, while in the wettest areas there are either grey soils, or, under conditions favorable for accumulation of organic matter, black soils. Where the land has been especially wet, in some places beds of peat and muck have accumulated. In southwestern Ohio the glacial drift is much older than that over the most of the state. As a result of greater length of time during which weathering has been in progress, the soils are much more leached and in

other respects differ markedly from those of the younger drift to the north.

In northwestern Ohio at the close of the glacial period an extension of Lake Erie covered much of this portion of the state. Beach sand and gravel was laid down around the borders of the lake, while on its bed heavy clays were deposited. As a result of poor drainage organic matter has accumulated, giving over large areas of heavy black clays.

In marked contrast to the glaciated region is southeastern Ohio—the unglaciated portion of the state. There the soils are residual, formed as a result of the weathering of sandstones and shales. Moreover, the surface of much of the country is rough and broken, being cut up by numerous valleys, giving narrow bottom lands, steep valley walls, and ridge lands of varying width, resulting in much land having too steep a slope for cultivated crops.

Within this unglaciated region in southern Ohio in Adams and adjoining counties, there are areas of residual soils formed from the weathering of limestone—the northern extension of the limestone region of Kentucky.

In view of the variations in soils in different parts of the state, to what extent can the agricultural tendencies be explained? First, consider the general farm crops. Their distribution is state wide. Where are they being grown in greatest amounts? The greatest production of corn is in western and northwestern Ohio in those counties where there are large areas of heavy dark colored glacial limestone soils. In northeastern Ohio where the soil and climate are not favorable for the ripening of corn, silage corn is grown. Since this is a dairy region ensilage is of great importance. Wheat production is largely centered in those counties along the border of the younger glacial drift, and

makes it best development on the well drained soils of these areas. That the production of oats should be confined largely to the northern half of the state is a result of climatic conditions, rather than soil factors, for this crop demands a cool climate. Rye is grown in southwestern Ohio in those counties that are too far south for the successful production of oats and on soils either not well adapted to wheat as the "white clay," or on those where long cultivation has rendered wheat unprofitable.

The areas in meadow and pasture (not including clover fields) are increasing in the eastern and northeastern parts of the state. In the production of hay northeastern Ohio leads. There much of the soil is heavy, naturally poorly drained and of a yellowish grey or grey color, and gives fair returns when used for hay and pasture, even when other crops are poor. The soil is lacking in lime, and hence not well adapted to clover or alfalfa. The maximum production of clover is in western Ohio on the glacial limestone soils.

The production of special farm crops is often more strikingly related to the character of the soil than is the case with the general crops. Potatoes are being grown largely in northeastern Ohio where the better drained, more or less acid soils give as good returns with this crop as with any that could be grown. Located as it is in a region of numerous cities with large manufacturing industries, a ready market is furnished. Sugar beet production is con-

fined almost entirely to the lake plain of northwestern Ohio where the climatic conditions are especially favorable, and the favored soil—the heavy black clay—yields a large tonnage with satisfactory sugar content.

A large percentage of the tobacco crop is grown in Montgomery, Darke, and adjoining counties where the soils have been so favorable for the production of a product of excellent quality, as to make "Montgomery County" tobacco a standard of the market. Alfalfa is at its best on the well drained limestone soils of west central Ohio. Soybeans are being grown most extensively in the southwestern part of the state, where they furnish a legume on soils not well adapted naturally to alfalfa and clover. Onions are being produced in a large way in those counties in which are located areas of muck and peat, and in this industry.

Similar relationships can be pointed out for other crops. Not only is the region of maximum production closely related to the character of the soil, but also the decline in acreage and production can often be accounted for as resulting from a lack of adaptation of the crops to the soil.

In the development of the agriculture of the state, experience has pointed out the crops best adapted to the conditions of the region, and the present tendencies are the result of an appreciation of these relationships. To a great extent these tendencies are dependent on the character of the soil.



FARMING IN SOUTHWESTERN OHIO

By FORD S. PRINCE

(Mr. Prince is county agricultural agent of Greene County. He answers in this article this question,—“What are the soil fertility problems in the most fertile section of Ohio?”)

IF any one reads this article who has not heard of the Miami valleys, let him turn at once to the map and observe the location of one of the most fertile farming sections of the world.

No other area in the United States is so rich with agricultural history as Southwestern Ohio. For, in this corner of the state, Leaming corn has been produced for nearly a century, Reid's Yellow Dent was originated and the Poland China hog was developed. Were there no other significant facts connected with Southwestern Ohio, these three products alone would justify her claim to fame in agriculture.

The fact is that southwestern Ohio is full of good farms and prosperous farmers. This is a condition which goes hand in hand with a fertile soil. Parts of this section might well be classed as the garden spot of the world, so rich and productive are the fields. In fact it has been suggested (by farmers living nearby) that the Miami valleys may have been the Garden of Eden.

All of the soils of southwestern Ohio have been modified more or less by glacial action. All of one county and a portion of half a dozen others lying close to the Ohio river were covered with a loessial deposit following the glacial period. This deposit consisted of soil material carried by water from the melting end of the glacier into the valleys and spread from there by the wind to higher ground. Because of this difference in formation the soils of this loess-covered area present a somewhat different problem in management than the soils of the strictly glaciated area. The fact is that the land in most of the loess-covered area is not so valua-

ble as that in the other counties; significant because it means that the soil is naturally not so productive and requires more expensive methods of soil management to grow large crops.

All of the most level portions of southwestern Ohio either are drained or need under drainage. In fact some of the more rolling portions of the section would be better underdrained inasmuch as they often wash and gully badly where this is not done. In the loess-covered area (Clermont County Experiment Farm) the indications are that unless these soils are drained the maximum results can not be obtained from fertilizer, lime and manure. The experiments on this farm also show that unless these materials are used the fertility of the soil is soon depleted so that it does not pay to tile the land.

Southwestern Ohio is a great live stock section. Many of these counties ship only a small proportion of the grain they produce, but feed it on the farm. Manure is produced in abundance and generally allowed to waste. All of the soils of this section need potash and nitrogen, the very elements manure is rich in, and the elements which are allowed to go to waste are the very ones needed. Strike a farmer who feeds on a concrete floor and hauls his manure regularly or one who has a manure shed or covered barnyard and you will find he is raising better crops than his neighbors. Only a few farmers are handling their manure in this way.

Experimental farms in a few of the counties of this section have results to show that nitrogen and potash both give an increase in crop yields; but that at present prices these elements are too

expensive to buy. Nitrogen therefore should be obtained from growing legumes and producing manure on the farm. The potash supply can be furnished by saving the manure and by rendering that already in the soil available by growing legumes and plowing under an abundance of organic matter.

Under a system of soil management where legumes are grown and where the manure is saved, the only materials

greater quantities per rotation than the average farmer applies, and still with a great profit. It would seem therefore that farmers could well afford to spend more money for acid phosphate in this section than they are at present wherever grain is grown.

The recommendations for lime can not be quite so general or specific as those for acid phosphate. All of these soils are classed as "limestone" soils. But many of them have lost all their



SOUTHWESTERN OHIO IS NOTED FOR ITS LIVESTOCK

which need to be purchased for fertilizer in this section are phosphorus and lime. Generally speaking, acid phosphate has paid good returns on these soils. On the Miami County Test Farm acid phosphate has paid greater profit for the money invested than any other fertilizer, including manure valued at the cost of hauling and spreading. It has been used about as profitable on the Germantown Experimental Farm. Acid phosphate has not been quite as profitable on the Clermont County Farm but is the most profitable fertilizer used at the farm.

Generally speaking, the farmers of this section are not applying enough acid phosphate to obtain maximum crop yields. At all of these test farms acid phosphate has been used in much

lime in the surface soil and are needing applications of lime for better crops of clover and grain. In Greene County where we have used the Truog test extensively this year about 75 per cent of the soils tested have been found to be needing lime. Of the level dark colored soils, those underlaid by gravel are needing lime badly; those underlaid by clay are not sour as yet. The valley soils can not be said to need lime at present. In general in this section lime should be applied for alfalfa. If the soils are acid by the Truog test, a trial of lime on clover and other crops is worth while. These recommendations are based on evidence obtained by farmers and at the various experimental farms thruout southwestern Ohio. The fact that these soils have always been

classed as "limestone" soils has led many farmers into error concerning the lime problem. Many of the soils are now needing lime to get good clover and other general farm crops.

Southwestern Ohio is fortunate in having within the section an abundance of limestone and in places along the river valleys extensive marl deposits. A few of these marl beds are already being utilized by farmers in their immediate vicinity and they help solve the lime question locally in a satisfactory manner. Much of this marl is very fine in texture, is exposed to the surface and consequently very easily applied. If it is used in a lime distributor, however, the product must first be dried and screened. There is enough limestone and marl in this section to supply their

soils for thousands of years to come.

The rotation of corn, wheat and clover is the most common one practiced altho this is varied in the tobacco and oats growing communities. Many farmers seed timothy with the clover and let their rotation run four or five years. While there is a fairly good market for timothy hay, this rotation is not the best for the soil or from the profit standpoint.

Corn is the leading crop, however, and as long as it continues to be, general farming with hogs, beef cattle and sheep will flourish, which is only another way of saying that southwestern Ohio with its naturally fertile soil, improved by good soil management will continue to be one of the leading farming centers for the country.

SOIL FERTILITY PROBLEMS IN NORTHWESTERN OHIO

By M. D. MILLER

(Mr. Miller is county agricultural agent of Defiance County. He has been in touch with the farmers' problems in Northwestern Ohio for a number of years. He owns a farm in this section and operated it before taking up his present work. He sees the problems from both the practical and scientific viewpoint.)

IN beginning the discussions of the soil problems of Northwestern Ohio it may be well to state that this section presents, probably fewer difficult soil problems than would be found in any equally large area in the United States. The real problem of those interested in the development of this portion of Ohio in an educational, rather than a soil problem. The farmers do not realize that they are not now producing the maximum crops, possible under the existing climatic conditions, and that even the present yields can not be maintained indefinitely unless some attention is given to the replacing of plant food which is being rapidly withdrawn from what has seemed to some to be an inexhaustible supply.

To properly understand the soil condition of this section the geological and topographical conditions should be briefly considered. All of the northwestern Ohio is underlaid with a deposit of limestone. It varies somewhat in thickness, but usually in drilling for gas or oil several hundred feet of solid limestone containing both calcium and magnesium are encountered. The whole area was at one time covered with a glacier which carried to this section and deposited in varying thickness a blanket of soil which was fortunately very rich in limestone. As the ice melted and retarded northward a very large lake was formed as an extension of Lake Erie to the south and southwest. This glacial lake at one time covered all the north-

ern counties of this section of the state except Williams County and part of each of the adjoining counties. The glacial lake was drained in succeeding stages, each stage being of sufficient duration to build up sandy beaches which are now identified as sand ridges, commonly found throughout this area.

When the early settlers came to Ohio this old lake bed soon became well known as the Great Black Swamp. A dense growth of forest made it very difficult to clear and the level nature of

cult to determine whether it was a clay or a silt loam soil, until it had produced from ten to twenty consecutive crops of corn and thus reduced the humus content so that the so-called newness of the soil was destroyed. The continuous cropping system was followed by a rotation of corn and oats. Clover and wheat are being included in the rotation on many of the farms at the present time.

The type of agriculture of any section is largely influenced by the nature



DRAINAGE IS A BIG PROBLEM IN NORTHWESTERN OHIO

the country forced upon these early settlers a very serious drainage problem. They constructed numerous open ditches and in many cases enlarged the natural waterways, which were inadequate to the task of handling all the water which was hurriedly dumped into them thru these numerous artificial outlets.

After the timber was removed, the open ditches constructed, stump pulling, corn and tile came in order. This land was so rich in organic matter accumulated for centuries that it was diffi-

cult of the surface and the soil. There is no doubt concerning the adaptability of Northwestern Ohio to the production of corn, oats, clover, and wheat, except in those sections where a considerable portion of sand or humus is found in the soil, either sand or humus in excess, seems to increase danger of winter killing. In addition to the above mentioned crops there are some special crops that are worthy of mention because of the large acreage devoted to their production.

Sugar beets are satisfactorily grown

over much of this section. Good roads and railroad facilities usually being the limiting factors where labor is available for their production. Large acreages of cabbage for kraut factories, and tomatoes for canning factories, are found.

With a type of agriculture thus determined the problems present themselves in the following order:

Drainage.—As has been indicated the "Great Black Swamp" has been largely drained by open ditches and a few tile. Gradually this soil has become more difficult to drain. This may be accounted for by the fact that the old tree roots whose gradual decomposition had kept open the water courses leading to the tile, have been entirely eliminated, and the present system of farming is making the sub-soil more and more compact, so that tile every four rods and in the more impervious soils every two rods are not now 100 per cent efficient.

Experience has shown that some deep rooting crop such as alfalfa or sweet clover, will not only give a good profit from the standpoint of the money return, but that they are even more profitable when the beneficial effect which they have upon drainage is taken into account.

In the glacial drift soils, which were once supposed to be fairly well drained by nature, artificial drainage was resorted to only where the close character of the sub-soil or lack of slope rendered it advisable, but today, the value of artificial drainage on all this soil is recognized, as tile will carry off the excess water, cultivation can begin several days earlier in the spring, and the soils are warmer and more readily handled.

It needs no argument to prove that the drainage problem is the outstanding problem for this section of Ohio and is

becoming more difficult to solve. More tile drains are needed but a satisfactory method of making them permanently efficient is yet to be perfected. They have been given so much attention that the second great need of the soils has been neglected.

The analysis of the soil, experiments, and experience of the farmers, have all attested to the unquestioned value of phosphorus fertilizers in the agriculture of this section. (A seeming exception to the above is found in a small area within Paulding County.) There are farmers who contend that they have doubled their wheat crop, and considerably increased the following clover crops by a single application of acid phosphate. As the importance of adapting and following out a plan for the establishing of a permanent agriculture in this section, becomes more generally understood, there is little doubt that phosphorous will become a more important factor than it is at the present time.

Organic matter, nitrogen, and potash problems should be grouped together because they are not yet serious limiting factors in crop production and because all three can be taken care of at the same time. If the "legume habit" can be fixed to these farms while they are yet young and able to produce these valuable plants to perfection it is probable the next generation of farmers who possess these clover farms will be unable to break the habit thus acquired, and German potash and Chilian salts need never to become necessary to crop production here.

Lime is very plentifully supplied in all of the sub-soils at a depth varying from eighteen to thirty or more inches. Very little of the surface soil shows an acid reaction with a litmus test yet we find that it does not contain a large

supply of free lime or carbonates. A reaction with the strong hydrochloric acid test, is unusual with any except the deep subsoils. Natural leaching and large crops will soon make the use of lime profitable on much of this soil and it is already profitable when alfalfa or sweet clover is raised. There are a few isolated localities or parts of farms which need heavy applications but these are not common except in a few of the counties.

As we study the agriculture of this section we are led to believe that the farmers follow the principles presented by Cyril G. Hopkins, when he says that "It is the first business of every farmer to reduce the fertility of his soil, by removing the largest crop of which the soil is capable." But they have not adapted the other and equally important principles as suggested by these words. "Ultimate failure results for the land owner, unless provision is made

for restoring and maintaining productiveness. Every land owner should adapt for his land a system of farming that is permanent; a system under which the land becomes better rather than poorer." The opportunity of adapting a permanent system of agriculture that will be indeed permanent is presented to the farmers of Northwestern Ohio as it is to few other sections. They can start to day to build for the next generation with a full assurance that erosion which is such a destructive agency in the less level countries will leave the plant food elements, which are ever increasing in value, undisturbed. A legacy in the form of soil which is prepared for maximum production is so valuable that it cannot be compared with money, stocks, and bonds, it is not subject to thief or decay, but it is a foundation to be prepared by this generation upon which the next generation may build a permanent prosperity.

SOIL PROBLEMS IN NORTHEASTERN OHIO

By MYRON A. BACHTELL

(Mr. Bachtell, extension specialist in soils, has written this article to show how soil fertility problems have influenced the type of farming in Northeastern Ohio. He tells why it became necessary to shorten the rotation and grow clover instead of timothy.)

AGRICULTURE, in its broader application, includes not only the production of crops and livestock but also the home life, social activities and community problems of the rural people. In a section such as Northwestern Ohio it inevitably must be influenced by numerous factors. Probably no other section of the state has such a diversity of interests. Not all of them have had their origin in the open country; many are the result of the growth of cities and the rapid industrial expansion which has taken place in the last few decades. Most of these later however,

have affected agriculture in some of its various phases.

Dairying, long has been the dominant industry in Northeastern Ohio. Even before the present market for milk and cream developed the people were milking cows and making cheese. No doubt the thrifty settlers appreciated the value of livestock farming even on their new soils and they naturally turned to the production of milk and cheese because of their experience with this type of farming before leaving Connecticut. For many years sheep also found a place on the average farm but with the

development of a greater demand for dairy products their numbers gradually diminished and at present there are large areas where one scarcely can be found. In one other respect also the increase in urban population has affected agriculture. As the cities developed in size dairying was pushed farther back and the production of potatoes, fruit and truck substituted. This change to a more intensive phase of agriculture became an economic necessity as the soil increased in value.

Althou such things as industrial expansion, markets and climate have had their influence on the agriculture of this section the factor most easily traceable is the soil. This has been felt in many ways. Scattered thruout this north-east section are many areas of muck varying in size from a few square rods to a thousand or more acres. Onions and celery quite generally are produced on these muck soils. The most notable example is at Lodi in Medina County where a thousand acre farm has been in operation for several years. The business of producing and marketing its crops is in the hands of a company capitalized at several hundred thousand dollars. In the southern part of Ashtabula County another large tract of muck has been under process of development during the last few years. In addition, numerous small areas are used for the production, not only of onions and celery but also of general truck crops.

The characteristic of the soils of Northeastern Ohio which have had the greatest influence on the agriculture of that section is their low content of lime and phosphorus. It must be remembered that relatively this is an old section and many of these soils were farmed for nearly a hundred years before the seriousness of a lime and phos-

phorus deficiency was fully realized. It is a remarkable thing about these soils that in spite of the long-continued and in many cases almost total disregard of their prime needs they have remained as fertile as they have. Who is there that dares to prophecy what the agriculture of Northeastern Ohio would be like to day if the soil needs had been as thoroly appreciated a half century ago as they are now? Certainly there would be fewer timothy meadows and more of red clover and alfalfa.

These soils originally grew good clover. Evidence of this is not entirely lacking even today. Just recently a large tract of land in Ashtabula County has been cleared and put under cultivation. In spite of its poor drainage it grows red clover luxuriantly altho on similar land a few rods distant but longer under cultivation red clover consistently gives way to alsike clover and timothy. This change in the soil has not come suddenly. In fact, it has been so gradual that it scarcely has been noticeable. But the memory of red clover still lingers, and gradually its failure has been acknowledged as due to soil deficiencies rather than to seasonal factors.

The northeast section of Ohio lies in the glaciated area. The sandstone formation at Berea and the shale outcroppings east of Cleveland indicate the rock materials over which the glacier passed in its southward movement. A soil formed from such material could not be any too well supplied with lime even in the beginning. Inasmuch as lime and phosphorus go hand in hand there naturally was a deficiency of this latter plant food also. In accordance with the laws of nature which work surely altho sometimes slowly in matters pertaining to soil fertility this deficiency of lime and phosphorous be-

came more and more serious with added years of tillage and crop production. At the same time another inexorable law of nature was slowly being demonstrated. This was the law that the character of the legume and grass vegetation growing on soils is determined mainly by the composition of the soil and not by the seeds sown. In accordance with the law, as the deficiency of lime and phosphorus became more marked, red clover gradually gave way

nitrogen content, however. The subsoil drainage was impaired because of the lack of clover roots to open up the impervious layers of soil that were likely to form below plow depth. Not any too well drained originally, these soils were giving evidence of a steadily increasing need for drainage by artificial means. Crop yields suffered accordingly.

Under the difficulties of maintaining fertility that existed and because of the



NORTHEASTERN OHIO IS AN IMPORTANT DAIRY SECTION

largely to alsike clover and in time on many soils, alsike gave way to timothy.

This change in vegetation was due to soil fertility and in turn it had its effect on soil fertility. As it became more and more necessary to place reliance on timothy the gathering of nitrogen from the air by clover diminished and the soils suffered accordingly. What they needed was to be increased in nitrogen by the growth of clover but instead they were being depleted because of successive clover failures. The harm done due to failures was not confined to the

large amount of pasture land in this section it is not strange that reliance has been placed mainly on livestock farming. Altho as a conservation measure, livestock farming has not done for Northeastern Ohio all that its most ardent admirers expected, its shortcomings were due mostly to deeds of omission by the farmers themselves. Plant food wasted from manure does the soil no more good than the same amount sold from the farm in grain or hay. The waste of plant food has been a serious and regrettable thing and perhaps in

this regard Northeastern Ohio, because it produced more manure, has been errant than other sections of the state. For one other reason also dairy farming sometimes failed in its possibilities of soil improvement. In the enormous quantity of milk that has left the farms there has gone a large amount of phosphorus. Purchased concentrates have carried back only a very small part of that sold so that where reliance has been placed on manure as the sole source of plant food the meager supply of phosphorus in the soil steadily has been further depleted. Because of this and also because of the general shortage of lime, clover production on many dairy farms came to be very uncertain even tho manure was used in liberal amounts.

In general, however, the value of phosphorus began to be realized many years ago. This section was the pioneer in the use of the bone meal on wheat. Acid phosphate which now has largely supplanted bone meal shows benefits as great. The excellent wheat record which this section enjoys, no doubt is due largely to the use of phosphatic fertilizers. When the need for wheat was brought forcibly to our attention a year ago a study of the data available showed that altho in Ohio as a whole there had been a big decrease in wheat acreage during the past thirty years, this decrease had been least serious in the northeast section. In fact during this time many counties had slightly increased both acreage and yield of wheat.

Livestock production is another phase of the agriculture of Northeastern Ohio that has been affected by the characteristics of the soil. One has but to compare the cattle of the Shenandoah valley and the horses of the blue grass section of Kentucky with representatives of other sections to secure

evidence that animals are influenced by the nature of the soil on which they are produced. This is due to the difference in mineral content and growth producing properties of the crops that are grown on those soils. In Northeastern Ohio the offspring of draft horse stock persistently have remained undersized and some close observers have attributed this to the general feeding of timothy and other crops deficient in bone making material. Those who have studied this phase of the problem also have been led to believe that the dairy stock develops more slowly that is the case in sections where clover and alfalfa are more commonly fed. At any rate the best breeders of cattle in this section are particular to have a legume hay to feed, and with their present knowledge of lime and phosphorus they have no difficulty in growing clover for this purpose.

In respect to soil management the farmers of Northeastern Ohio may be considered as being in one of three stages. The first stage includes those who quite generally fail to pay any attention to the laws of soil fertility. Just how large this class is and just what they are doing in soil management is difficult to estimate but it is safe to predict that their soils steadily are decreasing in fertility. In the second stage can be placed those men who admit the laws of soil fertility but accept more or less doubtfully their practical application. In general they have a good attitude and like to keep up to date. They use phosphorus and perhaps a little limestone now and then. Their farms show neither an appreciable decrease nor an appreciable increase in soil fertility. Probably the majority of the farmers are in this stage. The third stage is represented by those men

(Continued on page 509)

HOW TO FARM IN SOUTHEASTERN OHIO

By JOSEPH F. BARKER.

(Mr. Barker is soil fertility specialist of the extension service at Ohio State. He tells how the wealth of farmers in Southeastern Ohio can be increased tenfold.)

SOME thousands of years ago invading hordes of ice overran three-fourths of what is now the state of Ohio. When finally the ice retreated the land had been leveled off and things were to be made anew including new soils from freshly decomposed rock

the earliest settled of any quarter of the state. The soils in this section, then, have for the most part been farmed the longest. So, for two very evident reasons, fertility problems here are now demanding earnest attention.

Nearly all the farmers in southeast-



ORCHARDING IN SOUTHEASTERN OHIO

material. Southeastern Ohio escaped this invasion and remained hilly. Streams and things in general continued in pretty much the same old ruts. From the standpoint of present day landowners the region that escaped the ice invasion was unfortunate. It is now somewhat handicapped in comparison, the soils are older and the percentage of arable land is less.

Partly by geographical circumstances partly for considerations of health and probably also from love of natural scenery southeastern Ohio was

ern Ohio are native born Americans and a very high percentage have an ancestry of one hundred years or more in this country. We, of the hill section, are justly proud of this fact, and the spirit of a new agriculture working in such a body of landowners is bound to bring forth wonderful results. Up to date, however, this very condition has led to a bit too much conservation and in some localities the farming population has arrived at a degree of complacency approaching that to be found in some communities further east. The

practical hearing of this on any agricultural problem is readily appreciated.

Southeastern Ohio has as many problems as any section of the state, but the basic one is that of making the soil produce good crops. Here one locality is more prosperous than another chiefly as the soil in one place contains more natural fertility than another. The possibilities of improvement under these conditions are so great, and the effects of an outstanding success so far reaching, that here the young ambitious farmer finds unusual opportunities and can reap unusual rewards. Measured in money values alone many of average ability, a studious turn of mind, and a sympathetic interest in farming can make a good success on land much below the average in productiveness for this section; by methods, too, that are of general application, and it has been so demonstrated. The unusual rewards referred to include the satisfaction of accomplishment, and the consciousness of having contributed materially to agricultural progress.

A study of farming conditions in southeastern Ohio shows that on the average one hundred acres of farm land, nine acres of wheat are grown, eleven acres of corn, nine acres of timothy, and three acres of legumes.

Pastures occupies forty-three acres, timber, twelve; and waste land, seven acres. In regard to livestock, there are three horses, three cows, five other cattle, five sheep, and five hogs kept per one hundred acres of farming land. About fifty pounds of commercial fertilizer are used per acre of cropped land.

From the amount of livestock kept, the acreage of legumes and the amount of fertilizer used it is very evident that fertility is not being maintained. In fact, any man, woman or child who ever lived on a farm in this section knows

that, as a rule, old land is less productive than new land. However, the soil problem from now on is much bigger than simply *maintaining* fertility; it is to build up to a higher degree of fertility than was found when the land was new. It can be done by methods that are entirely practicable and profitable and of general application.

The foundation for an effective program of soil improvement in this section is, of course, the liberal and systematic use of phosphorus and limestone; an outlay, present prices, of perhaps of five dollars per acre per year. Say six hundred pounds of acid phosphate and two tons of limestone on the basis of a three year rotation. There are conditions under which it is difficult to get the limestone applied, but these difficulties yield to solution. The use of these materials in sufficient amounts is the easiest part of program and the profit resulting is so great that any farmer who appreciates their value will employ them to the extent mentioned or more. We have in mind, of course, that there are cases where limestone is not needed and that it is always possible to determine such by a simple examination of the soil.

The next step in the program calls for a sufficient supply of nitrogen which must be obtained thru the growing of legumes and good management of manure. This phase of the question is a whole subject itself and is one which will always require the best study and scheming of the intelligent farmer. To make good progress in soil building probably twice as much nitrogen as is removed in cropping should be returned each year. For the average this would mean nearly one-third of the cropped land in legumes and two to four times the present average yield per acre of legumes. It will, of course, make possi-

ble the keeping of much larger numbers of livestock and at the same time it will mean smaller expenditure for commercial feeding stuffs.

Forty-three acres of pasture to twelve thousand pounds of livestock! Pretty thin pasture. The feeding of crops on land, pasturing, is one of the most effective means of soil improvement—provided two important constituents unavoidably lost in pasturing are kept supplied. These are phosphorus and limestone, and their judicious use constitutes the turning point in the management of pastures especially on soils naturally low in these materials. Improvement will then be rapid if some especially efficient legumes are introduced: alsike, sweet clover, and perhaps we shall soon be using some of the new varieties of

alfalfa well adapted for pasture. However, under such conditions bluegrass soon comes back and claims its place.

Dairying, hogs, fruit, wheat and sheep all belong to southeastern Ohio and success in soil management primarily determines the degree of success with any of these, excepting that the dog problem is foremost with sheep. Two or more of these important lines may well be given attention on any farm; a few will narrow down to one. These products are necessities and the likelihood of ever again having an abundant supply of them in this country is doubtful. The hill section of Ohio can increase her wealth ten fold by concentrating on these things. Let the timid and the doubtful observe the men who are already demonstrating how this can be done.

THE CORN CROP

By JOHN J. RIGGLE

(Mr. Riggle, who is a graduate student in soils, tells in this article how the corn field offers an opportunity to start a system of soil improvement.)

WITH the gradual return of agricultural production to a normal basis after a period of stimulation which has to a greater or less extent unbalanced our farming practices from a practical as well as a scientific viewpoint, we may again begin to regulate our husbandry, to meet the demands of a gradually increasing ratio of food consumers as compared to food producers. With this proposition must be considered the possibility of another crisis which will again throw our agricultural resources into a breach. The new program must look to the building up of an agricultural reserve against such a time. The fertility of our soil is the fundamental factor upon which food production depends, so our future

reserve should be built up by conserving fertility on our fertile areas, and restoring depleted areas to their original crop producing power.

The problem is one of a system of husbandry which will give increased yields, and at the same time increase the fertility of the soil. This state will put out a third of its tillable area in corn this spring, or about three million acres. The questions now arise: what treatment will be given each corn field in the state toward maintaining its fertility, and securing a profitable increase in yield? What will the same field be sown to next year and the year following? How will the field be treated so that when the same areas are again planted in corn, the soil will show an

increased productive capacity, and be producing profitably increased crops at the same time?

The relative acreage of the principal crops in the different sections of the state correspond to a rotation of corn, oats, wheat and hay in the southwest section of the state; a rotation of corn, oats and wheat or hay in the northwest part of the state; and a rotation of corn, oats or wheat, and hay two years in the eastern part of the state. The former rotation represents a turnover in five years with the yields reported, of about two hundred pounds of nitrogen and thirty-five pounds of phosphorus with a net loss of about ninety pounds of nitrogen and fifteen pounds of phosphorus. The second rotation corresponds to a turnover in three years of one hundred twenty-five pounds of nitrogen and twenty-five pounds of phosphorus, with a net loss of seventy-five pounds of nitrogen and twelve pounds of phosphorus. The last rotation corresponds to a turnover in four years of one hundred thirty-five pounds of nitrogen and thirty pounds of phosphorus with a net loss of thirty-three pounds of nitrogen and ten pounds of phosphorus. These represent crops not one-half as large as we would like to grow, and yet even here, it appears that the larger crops are being grown where there is the largest turnover of the elements of fertility. In other words the cycle of crops that can use and reuse the largest amounts of plant food, in the shortest rotation, providing the crops are disposed of so as to conserve their manurial value, is the rotation that tends to maintain the soil or increase its fertility.

The net losses per rotation are equal to the nitrogen which would have been returned to the soil in each rotation by

clover crops ranging from one to two tons per acre; and to applications of 16 per cent acid phosphate ranging from one hundred sixty to two hundred twenty pounds per acre. The hays grown in these sections have been mostly grasses and mixed hay, and the applications of fertilizer would average from twenty to forty pounds of acid phosphate per year.

These figures agree fundamentally with the results of years of experiments on the Ohio Experiment Station farm at Wooster. An experiment conducted since 1897 with eight tons of manure reinforced with three hundred twenty pounds of acid phosphate per rotation, applied on the corn crop, has given a twenty-one year average of sixty-six bushels of corn, twenty-eight bushels of wheat, and four thousand eight hundred pounds of clover hay, as compared with an average unfertilized yield of thirty-five bushels of corn, thirteen bushels of wheat and two thousand seven hundred fifty pounds of clover hay. The latter yields, by the way, are on a par with averages of the state. The average yields in this system of fertilization are also on the increase, as time goes on.

In another rotation of corn, soybeans, wheat and clover, where livestock farming is being compared with grain farming, it has been demonstrated that for the last eight years, an average of thirteen tons of stall manure can be produced per rotation by feeding or using for bedding all of the produce, except the wheat grain, which is taken off. The application of this manure on the corn crop, together with four hundred pounds of acid phosphate, and the further addition of three hundred pounds of acid phosphate on the wheat crop has produced as an eight year average, crops of sixty-five bushels of corn,

twenty-two bushels of soybeans, thirty-two bushels of wheat and two thousand four hundred sixty pounds of clover hay. Where no livestock was fed, all the grain was taken off, and all stalks and straw together with the clover crop were turned under, an average of fifty-eight bushels of corn, nineteen bushels of soybeans, and twenty-nine bushels of wheat has been grown. The same applications of acid phosphate were made in the latter case.

In other words the crop statistics for Ohio and the results of the Ohio experiments agree that the difference between maintained fertility, with good crops, and a constantly decreasing fertility, with small average crops, amounts to the fertility returned by at least one vigorous legume in the rotation, and preferably two; the application of three hundred fifty to six hundred pounds of acid phosphate per rotation, to the land; and the saving of all manures and crop residues in livestock farming, and the use of the leguminous green manure in a purely grain farming system.

The very satisfactory results being obtained with the use of sweet clover on depleted and undrained soils suggests it for a place in the fertility rotation in the early periods on such soils. Sweet clover rectifies some of the fundamental factors in depleted fertility. It opens up drainage to lower levels through the tracts of the root residues, loosens the soil, leaving it better aerated and in better tilth, and collects in its roots large amounts of mineral plant food material. Added to this its ability to gather nitrogen from the air and restore it to the soil, and its feeding qualities with judicious use, all make it especially adaptable as a soil improver in the early periods of rotation, where it can be grown two years before plowing

under for the corn crop.

The question raised above as to what treatment should be given the corn crop this spring, with the idea of beginning a permanent system of soil maintenance in the one case, or soil improvement in the other, hinges on the data given. It is obvious however that the soil does not jump from average crops to large crops in one year or one rotation. The proper beginning can be made by plowing down a heavy sod for the corn crop, applying the manure over as large an area as possible, and the use of two hundred fifty pounds of acid phosphate. The application of an additional two hundred fifty pounds of acid phosphate to the wheat in the spring will be the next step toward insuring the clover crop for the next season, which is the essential point to be looked to in the improvement program. The use of two tons of limestone will raise the yield of corn from ten to twelve bushels above average yields, and the residual effects will be evident in the clover crop.

The corn crop in the first season of the rotation, offers the opportunities of plowing under crop residues and vegetable matter and manures to insure proper amounts of organic matter and nitrogen throughout the rotation; of fitting the ground into a proper physical condition for the better development of the crops of the rotation; of incorporating into the soil acid phosphate and lime in such quantities as will be needed by the crops of the rotation, where they will be rendered available as they are used; and of giving the land a complete ridding of weeds, which will give the succeeding crops of the rotation more chance for development. It thus furnishes a starting point for treatments which may tend to build up a reserve of fertility for future crops.

WHAT LIMESTONE HAS ACCOMPLISHED FOR FARMERS IN GEAUGA COUNTY

By M. H. BARTTER

(Mr. Bartter is county agricultural agent of Geauga County. He has done a great service to the farmers of his county by encouraging the use of limestone. He tells in this article what the farmers have accomplished from it's use.)

GEAUGA COUNTY is situated in the northeastern corner of Ohio, directly east of Cleveland. The soils of this section of Ohio are naturally lacking in limestone since the underlying rocks are shales and sandstone and furthermore the effects of soil treatment are very apparent since the region has been settled for a hundred years or more and the virgin fertility is gone. The early settlers came from Connecticut and later from Massachusetts and Pennsylvania. Today over three-fourths of the Geauga farms are operated by their owners who are descendants of these early settlers.

Very fertile land may not be profitable when skill in farming is lacking. Alva Agee's statement that, "The greater part of our farming land in this country has very little value when dissociated from the skill of the men handling it," applies to Geauga County. The thing that contributes most to our wealth is the skill, interest, and watchful care of the owners who put themselves into their farms. Where the soil has had careful treatment it is productive.

CLOVER HAS FAILED.

Although more than two hundred thousand dollars worth of dairy feed is purchased annually, and feeding is done on cement floors, with the manure usually hauled and spread daily, clover has gradually failed to do its best on most farms. The Reuwee farm at Auburn, has been one of the best cared for farms in the county. Even here clover gradually failed, until finally lime was tried. It was truly a "miracle workers." The effect on the trial

plot was striking, even from a distance.

Four tons of clover per acre were grown on this farm, last year, from the first and second cutting. Mr. Reuwee said he wasted hundreds of dollars worth of clover seed before liming. All the crops in the rotation have been benefited and greatly increased. "Before liming thirty-five bushels of oats was the best yield, now we get double that and the corn is much better where the lime has made a good clover sod." Several acres of alfalfa made possible by liming the ground have added further profit to his feeding and net income.

O. A. Bartlett, of Thompson township, has hauled car-loads of limestone over dirt roads seven miles to his farm. His splendid hay crops are widely known; yet across the fence "poverty grass" rules supreme. He says, "If men would only try it, and get the result, they would see how easy it is to grow clover. In my years of liming I have not had a single clover failure." Of course he also uses plenty of manure and acid phosphate with his good system of farming.

Bion Hazen, at Muson, has kept a large dairy for years. Yet even with excessive amounts of manure clover was not a success; in fact he raised none. However, after applying two tons of limestone per acre, he harvested one of the finest crops of clover last year I have ever seen. He is proving that, "Lime, manure (with phosphate), and vigorous clover, will make the old farm laugh all over."

Harrison Dietrich is a successful

young farmer in another corner of the county. When he moved to his present farm three years ago it hardly paid to work it. Already his yields are among the best. "It is impossible to bring this land up without lime. I've put on extra amounts of fertility, but it won't come without the limestone. A ton of limestone per acre has been worth, present prices, at least fifty dollars to me." After a clover sod, due to lime, he had

sponse they did in the Old Country. In fact very often their crops are a failure.

I have just been to visit a fine laying field belonging to a Finn, that has failed to produce. The present owner for years has left on the field all that grew in place of a hay crop, drawing home from other farms large amounts of roughage for feeding. Two years ago I induced him to get a carload of lime-



LIME INCREASED THE YIELD 300 PER CENT

three times more corn, followed with ten bushels more of oats per acre.

Chas. Krauss, of Burton, has had good results from using limestone screenings, although he has also used the fine limestone with much profit. The picture shows two cocks of clover from a similar area; one part limed, the other unlimed. The lime made clover instead of sorrel and timothy. The yield was increased 300 per cent by lime and the corn and oats which followed were at least one-third better.

Quite a few farms in the county have recently been purchased by foreigners. Even with the very best hand cultivation they are unable to get the re-

stone. He spread two tons per acre on his wheat, and put on a good application of acid phosphate. The neighbor who cut the wheat said it was the best in the neighborhood. What is far better, the field has a mat of clover and gives every promise of a good clover crop. This with the manure produced in his dairy gives a foundation for permanent soil improvement. On dairy farms at least, "To him who can grow clover all things are possible."

The above illustration of the value of lime can be duplicated on farms in every township in Geauga County. Evidence on every hand in this county

(Continued on page 512)

HOW FARMERS HAVE PROFITED BY THE USE OF ACID PHOSPHATE

By L. L. MOWLS

(Mr. Mowls, county agricultural agent of Licking County, writes how the farmers of his county have saved thousands of dollars by the use of sixteen percent acid phosphate.)

THE use of acid phosphate in Licking County has had a slow but steady growth for a number of years until the fall of 1918 when acid phosphate was about the only fertilizer available on account of war conditions. Many farmers who formerly had used bone meal and fertilizers containing some potash were confronted with using such as 1-8, 2-8, 2-10, half and half goods, straight acid phosphate or do without. At this juncture the farm bureau stepped in and put on a campaign for the use of 16 per cent acid phosphate. The fertilizer agents were first asked to encourage the use of straight phosphate goods in preference to the lower goods. For in time it would be to their credit and to that of the fertilizer business in general not to urge upon the farmer low grade fertilizer which is often a disappointment. Credit must be given the agents in their support of this plan. Experiences of men in the county who had been using acid phosphate for a series of years were secured. Armed with this demonstrational evidence the farm bureau held township and community meetings where this knowledge was disseminated. In many cases charts were used to show the figures secured from the Ohio Experiment Station's work. Local men were found who were willing to come out and tell their experiences to their neighbors. These men brought out the fact that they had been able to grow as large if not larger crops by the use of acid phosphate than bone meal, which cost much more.

As a direct result of the farm bureau's work nine car loads of acid

phosphate were placed in localities where considerable mixed goods had gone before. To Mr. Black, local agent for the V. C. Fertilizer Company, and Mr. Pengelly, agent for the Royster Fertilizer Company, must be given much credit for educating the farmers to the use of car load lots of straight fertilizer. This spring, I am informed, not nearly so much mixed fertilizer is being sold as formerly and inquiry made among farmers brings out the fact that much more fertilizer will be used on spring crops than formerly.

Our farm bureau has been pushing the "use of lime" in Licking County as a splendid supplement to acid phosphate as a sound basis for a system of permanent soil improvement. Much of the money that went into higher priced low grade fertilizer is now being spent for lime.

In summing up what acid phosphate has and is doing for Licking County I might say:

First: The use of acid phosphate has been found very satisfactory by those who have given it a fair test as compared with bone meal and other brands of fertilizers.

Second: It is a means of establishing a permanent system of soil improvement on many farms where formerly there was no fertilizer used, at least nothing but low grade brands.

Third: It is cheaper than mixed fertilizers and consequently more has been used per acre than formerly.

Fourth: Since the use of acid phosphate has become so general the use of lime is being tried on a great

(Continued on page 512)

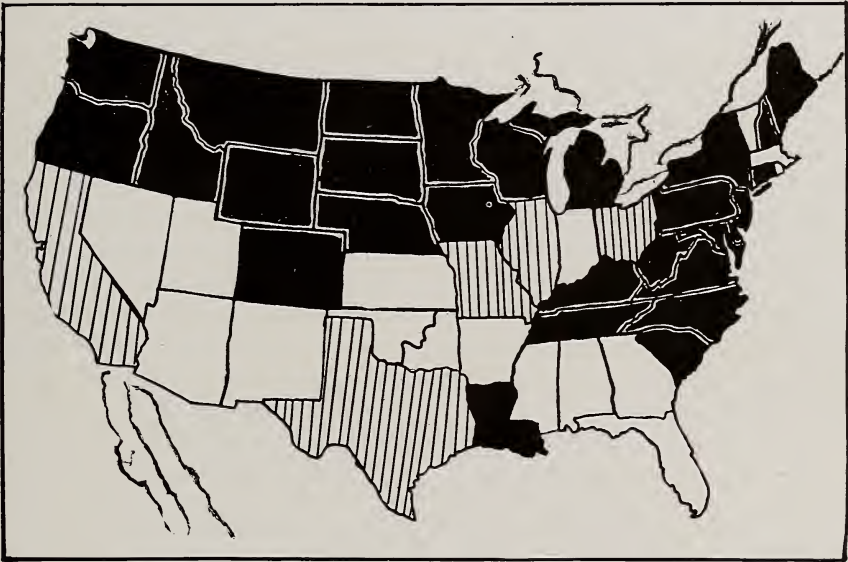
OHIO SEED LAWS

By V. C. SMITH

(The Demuth Seed Bill recently became a law. Mr. Smith, extension specialist in farm crops, was quite influential in getting the bill through the legislature. He discusses the law and how farmers will benefit from it.)

TWENTY-EIGHT states in the United States have laws which regulate the sale of farm seeds. These laws differ in many respects, some prohibiting the sale of seed which is found to be below certain standards of purity and germination or seed which contains certain noxious weeds; other states do not prohibit the sale of anything but require that all the seed sold shall be

tempts were made to procure seed legislation previous to the enactment of the above mentioned law which was passed in 1913. The first two attempts are said to have failed because the farmers of the state did not urge their passage and because there was certain very definite opposition on the part of the seed trade. When it was seen that the seed law would pass in 1913 certain interests



STATES IN BLACK HAVE SEED LAWS

Those in White No Regulations Those Shaded Have Bills Pending in the Present Legislatures.
(Ohio's Bill Recently Passed.)

labeled in such a way that the purchaser may know just what the seed contains.

The question naturally arises, "Is Ohio in the list of states having seed laws?" It may be stated that there has been a seed law on the statute books but it has never been enforced and could not be enforced hence our state was placed in the category of states having no seed laws. Two unsuccessful at-

were successful in having placed in the bill, some features that made the law impossible of enforcement. A fourth seed bill has been passed in the present session of the legislature and is known as the Demuth Seed Bill or Senate Bill No. 11.

“Is a seed law necessary in Ohio?” Let us consider some of the evidence. There have been so many complaints

concerning bad seed during the last few years that the College of Agriculture deemed it advisable last summer to make a brief survey of the seed situation in Ohio. The county agricultural agents were called upon to go into the market of their respective counties and buy samples of seed, just as a farmer would do, and send this seed to the University for analysis. In addition to the samples gathered in this way various members of the Department of Farm Crops during their travels over the state, collected samples wherever they could conveniently procure them. These samples were all carefully analyzed for purity and germination.

The survey revealed the fact that much good seed was being sold in Ohio. It also showed clearly that much seed of very inferior quality was being sold. Some samples were found to be especially high in weed seeds of a most dangerous kind. Seed was collected which was so high in weed seeds that if sown at the normal rate the farmer would be sowing more than one hundred thousand weed seeds per acre or more than three weeds to a square foot. These weed seeds included Canada thistle, buck-horn, dock and other impurities, but these impurities do not constitute the whole objection. Much seed which had the appearance of being of good quality was found to be very low in germination. Some samples were found to germinate 35 per cent. These samples which were bought at last season's prices, which was around twenty-five dollars, in reality cost the farmer seventy-five dollars a bushel for the seed that grew. Still these were the extremes, and when an average was taken of all the seed collected it was found to have an average of 76 per cent germination.

Why is there so much poor seed in

Ohio? There may be several answers to this question. Probably the most important reason is the fact that Ohio had no operative seed law. Every state touching Ohio, except Indiana, has seed laws which in a large measure prevents, within those states, the sale of bad seed. When seed cannot be sold in our neighboring states, it can be and is being dumped into Ohio, and sold to the farmers at market price. This has taken place so long that Ohio is being recognized as the dumping ground for bad seed.

In the second place, Toledo, Ohio, is recognized as the largest clover seed market in the world. When bad seed arrives at this market, if it cannot be sold to an advantage in a state having seed laws and can be readily sold in states not having such laws, it is only natural that this seed be sent to the closest outlet. Since Ohio does not discriminate against bad seed and happens to be the state in which Toledo is located it is only natural that this state receives more than its just portion of low grade seed. Another contributing factor is the practice of certain seed dealers in buying all the locally grown, good seed, ship the same to Toledo to be sold at highest prices, and in turn buy the low grade seed, ship the same back home, and sell it to the local trade at market price. This can be done in many cases at a considerable profit per bushel with the result that good seed is shipped out of the community and replaced by low grade seed at a very distinct profit to the dealer, but at an immeasurable loss to the farmer.

Will the pure seed law prove beneficial to Ohio? This question can be answered only by the experiences of states having seed laws. It is found that where good seed legislation has been in effect, the quality of seed sold in that

state is greatly improved. The effect has been so marked in certain states that instead of being the dumping ground for bad seed, these states today buy practically no seed except of the highest grade. Even the seed dealers of those states make the statement that it is useless to try to sell the farmer anything but the highest grade seed, and that there is no outlet for bad seed within those states. If this condition prevails in other states why should it not prevail in Ohio when the good seed law is put into operation.

The present seed law will not prevent the sale of any kind of seed in Ohio. If a man desires cheap seed he may procure it, but the law requires that all seed sold shall bear a label showing first, the name of the seed; second, the purity; third, the percentage of weed seed; fourth, the name of certain noxious weeds if they are present; fifth, the germination together with the month and year that said seed was tested; sixth, the name of the vendor or seller of such seeds.

This bill will enable any purchaser of seed to ascertain at a glance the quality of the seed. If it is bad seed he may buy it knowing it to be such, but poor seed cannot be sold for good seed unless the purchaser ignores the label.

What will be the effect of this law? The result of such a law can be measured by the attitude of the farmer toward such legislation. If the purchaser of seed will buy such seed as is shown by the label to be of high grade, it will be only a matter of a short time before the poor seed will have to flow into other states if it is to be sold, but if the farmer ignores the label or buys unlabeled seed the effect of the law will be seriously lessened and the law will gradually be ignored and finally become a dead letter.

Let us get in the habit of demanding good seed, of sowing only good seed and of thinking in terms of purity and germination of seed and most of our seed troubles will vanish. The matter is really in our own hands.

WHAT IS A FARM BUREAU?

By H. P. MILLER

(Mr. Miller, former County Agent of Portage County, is vice-president of the Ohio Farm Bureau Federation. He discusses here in a general way its purpose and field of activities.)

THE FARM BUREAU is a rural life improvement association. Perhaps this is what it should have been called. Less explanation would have been required as to its purpose. The early conception of its field of activity was that it should serve as the moral support, adviser and assistant of the county agent in his work of improving agricultural production.

Increased production thru application of modern science as developed by experiment stations and other investigational agencies was the basic idea on

which county agents were provided for by federal appropriation. But as soon as keen men got into the work of advising farmers along lines of production, they discovered that the farmers wanted and needed help in other matters. Some farmers needed information on the recent developments of agricultural science but many knew, yet were not able to avail themselves of the knowledge because of the expense involved.

Increased production was at once found to be as much a problem of economics as of efficiency. Then as soon

as farmers became organized they began to realize that they were in a position to improve their conditions in many ways which were not possible under the individualistic regime, as by the production of one breed of stock, one variety of corn, or other grain, the determining of the best variety of grain for the prevailing type of soil in the county.

Farmers have long felt that their most serious handicaps were in the field of commerce rather than in that of production. They have long realized that they both bought and sold at a disadvantage but individually they could do little to correct the situation. Many a farmer has been deterred from using lime, fertilizer, tankage, or cotton seed meal by not being able to buy to advantage. There was no way of group-in his needs with those of neighbors or or creating a demand among his neighbors.

The farm bureau acting thru the county agent is the cementing bond that is converting aggregations of rural dwellers into communities with mutual understandings, mutual interests, mutual enterprises, and what is more important, with a realization that the correction of most of the ills from which they have suffered is to be had thru concert of action rather than thru Congressional action.

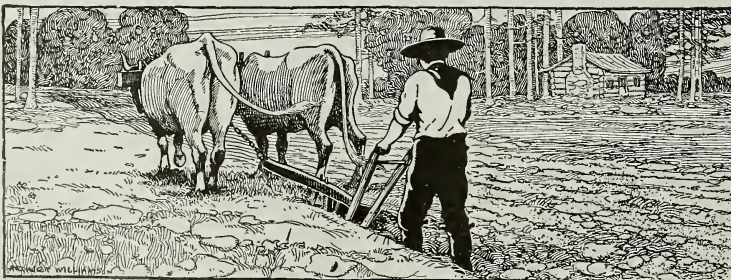
The first activity of the farm bureau is to develop team work. Men who have

been good ball players know what this means. No man is a good ball player unless he is as anxious to see every other man on the team play well as he is to play well himself. So the farm bureau concerns itself with the industrial prosperity of each individual. To this end it encourages the improvement of livestock and of crops, plans for better marketing facilities, and adequate financing of farmers, encourages cooperative buying and selling in so far as these are practical, and the standardization of products with the view of establishing confidence on the part of buyers.

The big tasks presented to the State and National Federations are: 1. The establishing of marketing systems which eliminate to some extent violent fluctuations in prices, excessive charges on the part of middlemen, unnecessary transportation and handling, and unequal distribution.

2. Influencing legislation with the view of preventing such as might unjustly burden or hamper agriculture, and of securing such as will enable farmers to conduct their business in the most efficient and profitable manner, and to enjoy a like measure of protection from the greedy and viscious.

3. To establish the right of food producers to equal compensation with others of similar degree of skill and intelligence, in short to establish industrial democracy.



THE VALUE OF AGRICULTURAL ENGINEERING TO THE FARMER

By W. P. MILLER, '19.

WHAT is agricultural engineering and what are its fields of endeavor? A few years ago this would have been answered by saying that it is the application of some form of mechanical power to the work of the farm, but today the limits of the agricultural engineer have expanded till we have at least eight well developed fields. All of these depend upon the older schools of engineering practice for the fundamental principles involved, but they are so closely linked up with the actual science and practice of raising farm crops and livestock, and the maintenance of soil fertility, that the agricultural engineer must first of all be a trained agriculturist in complete sympathy with the man who tills the soil. This understanding of the farmer's problems is only to be gained in the fullest degree from actual residence and work on the farm, and so it is from the farm that the best agricultural engineers will come.

The eight fields of agricultural engineering that we recognize today are as follows: (1) farm buildings: (2) farm building equipment: (3) farm power: (4) farm machinery: (5) water supply and sanitation: (6) drainage: (7) irrigation; and (8) farmstead arrangement, including landscape architecture.

Up to the present time the farmer has not heard much about the professional agricultural engineer, first, because he is not present in large enough numbers to satisfy the call of firms engaged in the manufacture of agricultural machinery, and of colleges where this branch of engineering is taught. Second because the farmers themselves did not feel or rather did not know that they

were financially able to call the professionally trained man to solve their problems.

It is the value of agricultural engineering, in dollars and cents increase to income and the greater value of the enjoyment and contentment that comes from the well planned efficient house, barn and farm that we wish to point out in this article.

Farm buildings are becoming more specialized all the time. The time has passed when we can keep horses, cows, sheep, swine, chickens, farm machinery

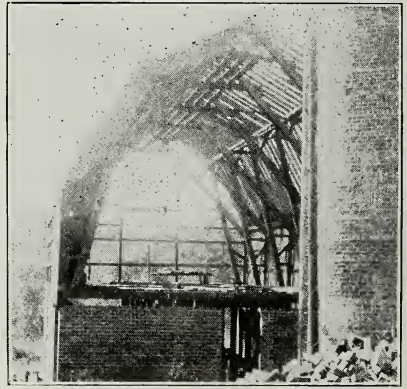


BALLOON FRAME BARN

and farm crops all under the one roof. Likewise we can no longer afford to let these valuable chattels remain unsheltered. The buildings naturally fall into three main groups: farm home and tenant houses, major farm buildings and outbuildings. The farm home should not be standardized and since it is a problem in farm architecture, and household engineering, it bequires the services of specialists if the fullest enjoyment is to be realized from the finished structure. Our agricultural institutions have employed capa-

ble architects to study the requirements of the farm home. They have developed the basic principles of farm house designing, but because of the inability to give each individual problem careful study, it remains for the professional agricultural architect to apply these principles to the needs of the individual farmer. The farm home differs from the city home in that it is nearly always the center of the farm business. We run to the house to telephone or to write a check or to get the medicine bottle. It is also the food factory, usually for a quite large family of hearty eaters, which means that there will have to be lots of cooking, canning and preserving, so that the ease of doing the work of the household depends very greatly upon the efficient arrangement of the rooms and their freedom from long walks to and from the centers of work. In addition it is quite largely in the home that the children will develop a liking or a dislike to life on the farm. Thus the element of attractiveness becomes a valuable asset in checking the longing for the bright lights. To incorporate all these elements in an architecturally beautiful house on the first attempt would mean years of careful study on the part of the individual farmer. Lacking these years of study, he naturally builds as his neighbor did before him, with the result that the wife drags thru years of ceaseless toil and the children long for a home in the town. Then too there is a mistaken idea that a building that is built from blue prints will cost more per unit of size than one "doped out" by the local carpenter, whereas the opposite is quite the truth, for the architect gives careful thought to the utilization of all the timber without waste and to economy in structural details. The last item alone will often pay the architect's fee.

The major farm buildings consist of the general farm barn in which the horses and sometimes the other livestock are quartered and in which the major portion of the farm crops will be stored, and specialized barns if dairying, hog or sheep raising are carried on extensively. Here again the trained barn designer has the advantage over the local carpenter, because of his broader experience. Modern barn construction differs so much from the old system of heavy timber framing that the old carpenters, being afraid to tackle the job alone, keep on advising the use of the



ABUNDANT MOW ROOM

old type with its heavy posts that prohibit rearrangement of the lower story and cut up the mow space.

The saving in timber and labor in the construction of the balloon frame or plank truss type of barn, is alone more than enough to pay the cost of designing, with all the added advantages, of easy rearrangement and greater mow space.

In the design of the outbuildings there is great chance for improvement: first, in the design of granaries for ease in handling grain; second, for the improvement in the interior arrangement of poultry and hog houses, and the construction of their roofs; third, for the

designing of better facilities for the housing and repair of farm machinery, and for the improvement of these buildings from the standpoint of beauty. Here again the professional farm architect renders the best service because he is able to study more different types of construction and choose the plan best fitted to the situation.

The second field of agricultural engineering, that of farm building equipment has only just begun to be recognized by the practical farmer. The shortage of dairy help during the war brought forcibly to the attention of the dairy farmer the necessity of installing at once the automatic watering bowl, the feed and manure removal cars and the use of the milking machine. These are real helps in cutting down the back breaking work connected with dairy farming and no one can stay long in the game who does not install such equipment. The field of the agricultural engineer in this line is not so much that of specifying the kind of equipment the individual should buy as it is in the development of better equipment and the standardization of the types already used in production. The American Society of Agricultural Engineers has already done much along this line, and now has standard concrete manger designs with which most all the equipment of the reputable concerns can be used. Hay, feed and grain-handling machinery is coming into use rapidly, and the larger farms are now abandoning the older types of hay handling machinery in favor of the newer grab hook, hay slings and high speed engine hoists.

The third and fourth branches of agricultural engineering may well be considered together from the standpoint of the farmer, though to the manufacturer they represent two distinct lines, except when we begin to consider the

development of large size machines using some form of power other than horse flesh. This is the age of machinery and labor saving devices. When the shortage of labor looms up on the horizon, inventive genius applies itself to the production of machinery that will enable the operator to turn out a larger amount of product for the same amount of exertion. If, in addition to solving the labor problem, the work of preparing the soil, the seeding, cultivation and harvesting of the same may be pursued more expeditiously and effectively, a still greater step in the march of progress will have been accomplished. The farm owner can well afford to secure the advice of the farm power expert in regard to the type and size of tractor best suited to his condition, or as to the availability of the power which a small stream is wasting upon the rocks back of the house. There are many places thruout Ohio where the rollnig topography makes excellent sites for small water power developments which would supply a community with electric light and power at much less cost than it could be secured by means of the small isolated plant.

Farm water supply and sanitation should receive much more careful attention at the hands of the farmer than they have received in times past, because of the ever increasing danger from polluted sources of water supply. On the larger farms where considerable stock is kept the matter of a plentiful water supply in all barns and fields becomes of great importance, especially in the winter when the stock is concentrated in the barns and feedlot. The question of dependable pumping machinery and power, and the storage of a supply of water brings up questions which need careful study of the local conditions

(Continued on page 500)



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THIS ISSUE

We have attempted in this number to present to our readers in an interesting and instructive way the status of Ohio's agriculture as regarded from the soil fertility standpoint. We are fortunate in having as contributors men who are recognized authorities in soil fertility work. Professor Bear discusses the changes in the agriculture of the state during the last forty years. Mr. Conrey explains how these changes were to a considerable degree due to the better adaption of the type of farming to the type of soil. Mr. Bachtell tells us about the problems of soil fertility, confronting the farmers of Northeastern Ohio. Mr. Miller and Mr. Prince inform us that in the rich sections of Western Ohio the question of fertility is becoming more and more important. Mr. Barker writes about the agriculture in the hill section of Ohio. Now we have a digest of Ohio's agriculture and her fertility problems. We see from it that in order to insure the future productivity of Ohio's farm land more legume crops must be grown. To do this the land must be drained, limed, and phosphated. There are a number of instances of farmers given in this issue who have become thoroughly convinced that by proper treatment any farm land in the state can be made to produce legume crops abundantly.

We are indebted to Professor Bear for many helpful suggestions on the makeup of this issue.

AGRICULTURAL JOURNALISM

The war has demonstrated beyond question the value of the farm paper. Liberty Loan drives and production campaigns would have been seriously handicapped had it not been for the service rendered by the farm press. Rural homes were reached by this medium that could never have been reached as effectively in any other way.

During the present period of reconstruction and the era of agricultural organization into which we have just entered, the farm journalist has the great task of keeping before the rural people the important agricultural problems of the day and being able to give dependable information and sensible advice relative to their solution.

There is reason to believe that the field of agricultural journalism will demand more and more of the agricultural college graduates as time goes on. In order to qualify men for this work the college must develop a department to give the proper training for the work. Let us suggest at this point a department of Agricultural Journalism. It is not a new thing. Iowa State College and the University of Wisconsin have had departments of this kind for several years. They offer courses in agricultural advertising, editorial writing, farm paper study, and bulletin writing and editing. Practical experience is secured by doing work on the college magazine. THE AGRICULTURAL STUDENT would afford practical work in the department here at Ohio State. In fact the department could be given the responsibility of publishing the magazine. Until a reorganization of the suggested kind is made THE STUDENT cannot do its greatest service to the men in the college which it represents. We are looking forward to the time when Ohio State can have an agricultural journalism department the same as Iowa and Wisconsin.

GOOD-BYE "1-8-1"

The doom of the low grade fertilizers has been sounded. The fertilizer makers have decided to standardize their goods and put the business of making and selling fertilizer on a more systematic basis. The most significant thing about the whole plan is that no fertilizer is to be sold that contains less than fourteen percent of total available plant food. This will eliminate the low grade brands of 1-8-1, 2-10-0, 0-10-2, etc. Farmers in the past have been influenced to buy these brands which were often too high-priced for the amount of plant food that they contained. It has always been more economical to buy fourteen to sixteen percent acid phosphate than to buy eight or ten percent with one or two percent of nitrogen or potash added. The small benefit derived from the presence of the one and two percent elements never did justify the extra cost. Farmers have become educated to this fact and have been demanding more and more of the high grade mixtures or sixteen percent acid phosphate. This changing demand has made it desirable for fertilizer makers to take this step of far-reaching importance. Let us hope that their plan will mature and that low-grade mixtures will be made a thing of the past.

THE PURE SEED LAW

We wonder if the farmers of Ohio fully realize what a great service was rendered them by their law-makers when they passed the Demuth Pure Seed Bill, which is discussed in this issue by Professor Smith. The law makes it illegal for seed companies to sell seed in Ohio that does not bear a label stating the percentage of purity and germination. If noxious weed seeds are present, the amount and kind must be stated. Remember this new law does not prevent the sale of bad seed in Ohio. If the seed is true to its label there is no legal recourse. Therefore study the label, if it bears a low germination or purity percentage, refuse to take it. Buy only seed whose label shows it to be free from noxious seed and high in purity and germination. But even then do not place too much confidence in the label. Examine and test the seed for yourself. If it does not come true to its label, report it to the State Board of Agriculture. If you are at all in doubt about the seed, send a sample to the Farm Crops Department at the Ohio State University. They will test and examine it free of charge. It is now a question for the farmers of Ohio to decide for themselves as to how much bad seed is to be sold in the state. Professor Smith says, "Ohio has been the dumping ground of bad seed for years, since every state near Ohio except Indiana has had pure seed laws." How long it remains to be so depends upon the farmer himself. Watch the label.

THE HORSE SHOW

The seventh annual horse show which will be held on Ohio field May 3 is the first show to be held since the beginning of the war. Preparations are now being made for staging the biggest and best event ever put on under the management of the Saddle and Sirloin Club of Ohio State University.

Entries to date show that the leading light-legged horses of the state will compete for the attractive premiums which have been secured. Future events will add to the variety of the afternoon's program. Keen competition is looked for in the three and five-gaited saddle classes as there is an abundance of entries.

Every student should be a booster of the big show.

YOUR DOG

Oh, where is your wandering dog tonight,
While you sweetly slumber and sleep?
Is he safe at home under lock and key,
Or out killing a neighbor's sheep?

Do you always give him his daily bread,
Or must he hook that from the hens,
And does he forage around for his eats
In the neighbors' pastures and pens?

Does he work each day for his bed and board,
And never do mischief or harm,
While faithfully watching the kids and house,
And all of the stock on the farm?

If he's not worth while in some useful way
And doesn't pay for his care and keep,
Consign the cut to his bed beneath the sod,
And end his raids on the sheep.

—Dr. Alexander.

Campus Notes

THREE-YEAR CLASS GRADUATES

The graduation exercises and annual banquet for the six seniors of the three-year course in agriculture were held in Ohio Union March 20. F. L. Allen, supervisor of farmers' institutes and extension schools, delivered the class address. Dean Vivian presented the certificates and acted as toastmaster of the banquet.

The six graduates were: John C. Beaver, Greenfield; Williard E. Brown, New Lexington; Harold A. Raley, Hanoverton; Harold J. Bither, Sylvania; Harold V. Steinle, Cincinnati; and Narcisco Jimenez, Philippine Islands.

HORSE SHOW AGAIN

The annual horse show will be given again this year. This affair, which is put on by the Saddle and Sirloin Club and which has not been given for two years on account of the war, will be given, with new features, Saturday, May 3.

The show will consist mainly of the exhibition of light-harness and saddle horses, and should attract a large entry list, as it did in past years. A judge at the last show said: "This is the best horse show that is put on between New York City and Chicago."

The exhibition will be held on the campus, at Ohio Field, and will be entirely in the hands of the students. Charles H. Sprague, '19, manager of the show, announces the following committees:

Awards: Sanford G. Price, chairman; Harold M. Bishop and Philip E. Heim. Publicity: George F. Henning,

chairman; Howard A. Waugh and Glenn F. Rupert. Entries: Otto J. Smith, chairman; Warren M. McVey, and J. E. Eckelberry. Programs: George B. Arthur, chairman; Samuel A. Porter and William S. Mozier. Grounds: Robert P. Hall, chairman; Sam S. Studebaker and Thomas A. Reber. Tickets: George W. Kreidler, chairman; Ray J. Smylie and Morris B. Sanford.

NEW POULTRY SPECIALIST

Henry Munroe has been appointed extension poultry specialist. He was graduated from Storrs Agricultural College in 1916 and has been engaged in poultry work there from the time of his graduation until he received his appointment here.

Mr. Munroe will travel over the state in poultry extension work, and will have supervision of the poultry clubs. Part of the summer will be devoted to boys' and girls' poultry clubs, conducted cooperatively with the University.

OIL TEST

An oil test is to be run soon by the advanced students in Agricultural Engineering. It will be to determine the value of a good lubricating oil as compared with a cheaper grade. The test will be run on one of the medium sized farm tractors for thirty hours duration and at full load. Readings of the temperature of oil and water will be taken every ten minutes. It will be a non-stop run. This test should give some valuable information for tractor owners and manufacturers.

COLLEGE MAGAZINE ASSOCIATION MEETS

The annual conference of the Agricultural College Magazine Association was held on the campus March 28 and 29. Policies of the agricultural college publications were discussed. Advertising plans for the coming year were standardized.

Representatives were as follows: E. B. Sullivan, Cornell; P. R. Kraybill, S. A. Horst, and W. R. Williams, Penn State; L. E. Husted, Purdue; Mr. Dustin, Illinois; Z. R. Mills and Professor H. R. O'Brien, Iowa.

Officers for the following year are: Z. R. Mills of Iowa, president; F. L. Horst of Penn State, vice-president; G. B. Arthur of Ohio State, secretary-treasurer, and E. B. Sullivan of Cornell, manager and director. The representatives of the colleges were entertained at a banquet in Ohio Union Friday at 6:30 p. m. E. B. Andrews, business manager of Kimball's Dairy Farmer, spoke on agricultural college publications and pointed out their value, in that they reached a selected number of readers not covered by the commercial publications. A general discussion of agricultural advertising followed. A luncheon was given for the representatives at the Deshler Hotel, Saturday noon by Mr. Andrews.

REGISTRATION FIGURES

A report of the registrar for this semester shows that there are now enrolled four hundred ninety-eight students in the four-year course in agriculture as against five hundred thirty-seven at this time last year, and thirty-seven in the three-year course as against one hundred fifteen at this time

last year. The total enrollment of the university is now three thousand five hundred eighty-eight while a year ago the enrollment was three thousand five hundred sixty-six.

Y. M. C. A. DRIVE

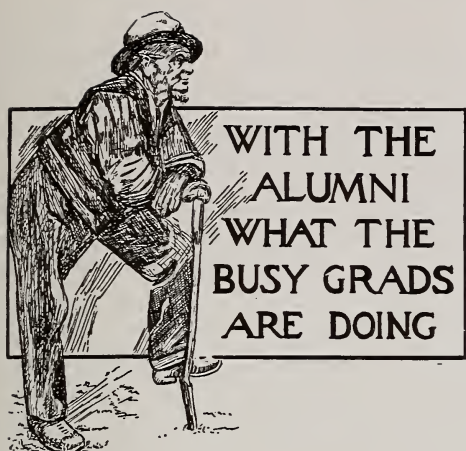
About eleven hundred members were secured in a three-day Y. M. C. A. membership campaign on the campus ending March 19. In the "Ag" college about 65 per cent of the men joined.

PROFESSOR FALCONER RETURNS

Professor John I. Falconer of the Department of Rural Economics, has returned from Washington, D. C. Mr. Falconer, Mr. Smith from California, and others recognized the Farm Management Department. It is now known as the Bureau of Farm Management and it is the first time that this branch of agriculture has been put on the same basis as animal husbandry or soils. Prof. Taylor of Wisconsin, has been chosen as chief of the department.

NEW BUILDING NEEDED

Mr. Chester of Paulding County, has introduced a bill into the House of Representatives for a new building for the Agricultural Engineering Department. This structure is much needed for all "Ags" know and realize how valuable the Agricultural Engineering Department is. The men on the instructional force are of the best in the country and they simply have not the facilities to work for the better advantages of the students and the state as a whole. All "Ags" should boost for the new Agricultural Engineering building.



James C. White, '05. is farming near Delaware, Ohio.

'07.

Prof. John C. McNutt has been selected by the Y. M. C. A. to go to Europe to organize the Animal Husbandry branch of educational work for soldiers. He has been head of the Animal Husbandry Department at the Massachusetts Agricultural College. Previous to his work there he was manager of the Hartman Stock Farm at Columbus, Ohio.

Raymond R. Peck is now with Company C, 308th Engineers at Arzheim, Germany.

'08.

E. J. Petry formerly assistant professor of botany at Purdue is now at the University of Michigan.

C. W. Hengst is farming near Lancaster, Ohio.

'10.

D. R. Vanatta, who has been County Agent of Hamilton County, has resigned his work and accepted a position with the McCullough Seed Company of Cincinnati.

'11.

Perry Van Ewing is Animal Husbandryman at the Georgia Experiment Station.

Lawrence Wright is running a dairy farm at New Vienna, Ohio.

'12.

Erskin Wright is owner and manager of dairy laboratories at St. Louis, Mo.

Ralph R. Walker is Agricultural Agent for the Missouri, Kansas & Texas Railroad, and is located at Dallas, Texas.

'15.

R. B. Dustman will begin work with the soils staff of the Extension Service April 15. After graduation he taught agronomy in a high school for some time, but has been with the Agron-



R. B. DUSTMAN

omy Department of the University of West Virginia for the past three years. He was married two years ago to Elsie Zinn, also an Ohio State graduate and daughter of the Associate Editor of the National Stockman and Farmer. Mr. Dustman will have charge of the work in southwestern Ohio.

S. F. Hinkle is doing graduate work in soils this semester. After graduation he spent one year on the farm and then taught agriculture and science in high school one year. Since that time

he has been County Agent of Webster County, West Virginia.

William Bidlinger is with Company B, 25th Engineers at Brest, France.

Paul C. Kitchen has recently been detailed to the Madison Laboratory of the Forest Reserve to do work in wood technology.

Chas. E. McAnall is farming at Mt. Gilead, Ohio.

A. E. Cleland is with the 269th Aero Squadron at Las Ballas, France.

R. L. Flemming is teaching school at Youngstown, Ohio.

Robert Wylie taught Dairying last year at Ames, Iowa, but this year he has charge of the same work at South Dakota. Charles E. Wylie is head of the Dairy Department of the University of Tennessee. Both of the Wylie boys received their master's degree at the University of Missouri.

E. D. Faust is with the Army of Occupation at Coblenz, Germany. He is a First Lieutenant of the Company B, 308th Engineers.

R. S. Smith has a large Jersey herd at Westerville, Ohio.

Harry Summermacher is manager of the Daisy Hill Farm at Chagrin Falls.

Arthur H. Smith is a first lieutenant in the Chemical Warfare Service, and is stationed at New York City.

Raymond E. Shook is working for a creamery at Washington.

'16.

C. M. Salle is first sergeant of Company E, 38th Infantry, now at Obermending, Germany.

Arthur C. Weisenberger is City Dairy Inspector of Cleveland.

Clayton H. Elliot is farming at West Mansfield, Ohio.

'17.

George Valley is doing graduate work in the soils department, and will receive his masters' degrees this spring. After attending an agricultural school in Russia he came to this country in 1906 and has remained here since that time with the exception of one year which he spent at his old home in the Baltic Province, Esthonia. He attended high school in Cleveland and later entered Ohio State University. During his junior and senior years he was student assistant in Agricultural Chemistry and in his senior year was elected to the Honorary Chemical Society and the Sigma Xi. He is now working with research problems in soils.

Captain Carl C. Lowe has returned to his home at Medina, Ohio.

Elmer Helbig, assistant in the Dairy Department '17-'18, has received his discharge from the aviation branch of the army and has accepted a position with the Sanitary Pure Milk Company at Canton, Ohio.

'18.

John P. Courtright is with an evaporated milk company at Delavan, Wisconsin.

John M. Sawyer is now at the Fourth R. O. T. C. at Camp Grant, Illinois.

E. L. Shuck is in the Radio Training Station at Newport, R. I.

C. B. Eddy is just returning from France.

Ex-'19.

Floyd Buswell is now married and farming at LaGange, Ohio.

J. H. Houser is an ensign now located at Pelham Bay, N. Y.

D. E. Leader is first lieutenant at Celency, France.

Home Economics Department

WHAT THE HOME ECONOMICS GRADUATE CAN DO BESIDES TEACH

By ROSETTA R. HARPSTER, '19

(Miss Harpster writes this article as a result of a semester's investigation of the opportunities in vocations other than teaching for the Home Economics Woman.)

TWO questions, "What shall I choose for my electives in my last two years of college?" and "What shall I do when I am graduated?" becomes rather vitally interesting to the Home Economics student in her sophomore year, more so for the young woman in this department than in others, because the first two years are filled with required subjects. Electives should be chosen to prepare the young woman as well as possible for the vocation she will follow after leaving the University, so it is important that the matter be decided as early as possible. In recent years people have come to appreciate much more fully than they used to, the value of choosing a vocation over drifting into a job; the individual is benefited by being in congenial work, obviously, because she is happier; society is benefited, almost as obviously, because people produce more in work they like and to which they are adapted.

TEACHING NOT THE ONLY FIELD

Teaching used to be practically the only field the educated woman ever entered and is still one of the first considered. But the young woman of today should not make the mistake made by so many in the past, of becoming a teacher because she is unaware that there are other fields open to her, because she does not consider them, or by merely drifting into teaching because it is easy of entrance and immediately offers a living wage.

Women are now engaged in some nine thousand occupations but only a comparatively small number of these will be attractive to the type of girl for whom we are considering vocations. Almost any one acquainted with the field of Home Economics will say that there are many openings of various kinds for the woman with this training, but stating cases is a different matter, hence this attempt to list some of the fields, with the requirements for entrance into and success in them. The young woman is assumed to have had the subjects required for a degree in Home Economics at Ohio State University.

ADVERTISING

Advertising is a field which requires ability to write clear and forceful English as well as recognition of good designs and values. The Home Economics woman should be especially successful in advertising foods, clothing for women and children, and household furnishings and appliances. Journalism and courses in advertising would aid in preparation.

Buying, i. e., the headship of departments in stores, requires knowledge of the goods sold, taste, and executive ability. The Home Economics woman should be a good buyer for the departments named above. Courses dealing with the particular kinds of goods which the young woman expects to handle will be of evident value. To attain a buyership it is necessary to work

up from the selling of goods over the counter; this apprenticeship would last from a few months to a year or so.

DAIRYING

Chemistry and bacteriological work in a dairy is mostly testing samples of milk and recording results. There is little chance for advancement, but one young woman has stepped from such a laboratory into establishing a Home Economics department in a dairy. Cow-testing is also allied with the dairy industry; these workers travel about the country spending one day a month at the farm of such member of the Cow-Testing Association which employs them. Pathogenic bacteriology would aid in preparation for the former work, courses in animal husbandry for the latter.

CHILDREN'S HOMES

Work in Children's Homes would doubtless attract many young women who desire to do social service work were it not for the exceedingly low salaries paid to matrons; anyone wishing to be a superintendent would probably have to undergo preliminary training as matron before being qualified to take the civil service examination (for which only persons over twenty-five years of age are eligible) for the superintendency of a county institution. Requirements may not be so rigid in privately managed homes.

DIETITIC WORK

Dietitics in a hospital attracts many young women from the Home Economics department. To qualify for a position as head or assistant dietitian it is necessary to take a hospital course lasting from three to six months to get the practical training needed after University work is finished. The student dietitians are not usually paid.

Executive ability is one of the greatest factors in the dietitian's success.

EXTENSION WORK

The Extension Service attempts to take the University to people unable to come to it, by means of lectures and demonstrations; ability as a speaker is necessary to the extension worker. Allied to the work of the Extension department is that of the County Home Demonstration Agent. This work corresponds among the women to that of the County Agricultural Agent among the men. The demand for women with the executive ability for this work is at present greater than the supply.

WORK IN HOTELS

Work in hotels will probably be entered by more women constantly; there are few positions in such an institution which cannot be taken by women as well as by men. The best training for such work would be a year or a year and a half in a large hotel, doing work in every department. Somewhat the same as the hotel problem is that of the House Director in an institution; a mature woman is demanded in this sort of work, however. Her work includes the buying of supplies, planning of dietaries, and direction of all the help. Courses in institutional management would be valuable; executive qualities are needed in this work also.

Household Education is a new branch of social service work akin to and allied with the work of the District Nurse. The educator does "case" work, visiting families needing assistance and giving practical aid and instruction in home making.

PROFESSIONAL HOUSEKEEPING

Household Management, or professional housekeeping, is quite a pioneer field and may prove the solution of the

present unsatisfactory conditions in many homes. Practical as well as scientific training is needed by the Household Manager as she goes into a home and takes the responsibility for the well-being of the family; she may buy the supplies for the table, prepare the food, and care for the house, or she may merely direct the work of other employees. There seems also a field for her in spending a short period of time in a household teaching the home maker to do her own managing.

ARCHITECTURE

House planning may well be taken from the hands of the uninterested man architect and given over to the woman who can arrange the rooms to give the greatest satisfaction to the people who will live in the house. She should do this work for an architect or a construction company building many homes, for she would not have the practical experience to actually contract for the building work. Another great field is in educating the general public to know and demand good housing. Courses in architecture and drawing would aid the prospective houseplanner.

JOURNALISM

Journalism is a field as yet little entered by the scientifically trained Home Economics woman, but she is needed there, as much of the "domestic science" material published is inaccurate or incorrect. To break into the magazines or to have articles syndicated it is necessary to submit them to the publishers and run the risk of having them refused. Regular newspaper work might be combined with the writing of this sort of material for a daily paper. One daily in Columbus maintains a Home Economics department and runs a model kitchen for the benefit of its advertisers, the young woman in charge gives occasional demonstrations

and writes a half column for each issue. This may be the only such department now operating but other papers may establish them if competent managers offer. Courses in English and journalism will be valuable to the young woman who wishes to write.

The Laboratory Technician does chemical and bacteriological work for a physician. From this a young woman may prepare for the work of pathologist in a hospital. All the bacteriology and physiological chemistry possible are advantageous to the worker in this field.

LIBRARY WORK

Library work is mentioned because of the probable demand for librarians familiar with the field of Home Economics as the movement spreads. To get a degree in library science it is necessary to take a two-year course in a library school after the Baccalaureate degree.

Personal shopping in a department store is mainly filling telephone and mail orders; success depends on getting the customer's point of view and pleasing her with the goods sent. In some large cities there are also women who make a profession of shopping with and for other women.

THE TEA ROOM WORK

Tea Rooms in department stores and cafeterias in factories are being opened as fast as competent managers can be found. The requisites for success in this field are knowledge of cookery, organizing ability for managing the people employed, and business sense in figuring costs and prices. Courses in quantity cookery and as much practical experience as possible are needed by the young woman going into this work. Several thousand dollars capital would be needed to start an independent tea room so it would probably be better to

start in a larger organization. Quality of food and service determine the success of the eating place.

APPRENTICESHIP NECESSARY

The young woman fresh from college cannot consider herself completely trained. Teachers get their apprenticeship by doing supervised practice teaching before leaving the University, but the young woman who goes into some other field must get hers afterward and pay for it in the low wage earned. The length of this apprenticeship varies from three months to several according to the vocation chosen and the ability and aptitude of the one entering it. For a number of the suggested vocations it seems that maturity is essential. Comparison of the desirability of surroundings in other vocations and in teaching is not made as the chances for being thrown with agreeable companions are approximately equal.

THE SALARY

Compared to teaching most of the other vocations are well paid; social service work is paid on about the same scale as teaching; the dietitian is likely to go in at a fair salary but never be advanced very far. Ability to work hard, knowledge of the thing dealt in, and executive ability are main detriments of salaries paid; there is no upper limit. The risk of discharge for inefficiency is greater than in the teaching field, however.

So for young women who have the qualities needed for success in the industrial world let me recommend entrance into the various fields other than teaching, unless they have a real desire to teach and real ability in that work. The teaching field will be benefited as well as the individual and society in general.

WHAT HAS HAPPENED TO THE GIRLS OF OHIO STATE?

IN one of his first talks made after his return from abroad, Huntley Dupre, the student Y. M. C. A. secretary, said, "There is a splendid new spirit at Ohio State, which has been created by the girls, and of which we are very proud." This is the spirit of democracy and cooperation, the same spirit which sprang up everywhere because of the war. The great sufferings of the war caused us to lose our own little interests to the one big interest of winning and ending the great struggle. It was war work that started it all at the University. An organization of all girls was formed such as had never been created before. We forget parties and dances in our desire to do our share. Sororities, as separate groups were forgotten except to vie with each other in doing most good. It was not a matter of what this group or that was doing, as it has always been, but what the girls of the University were doing. There was an awakening to our responsibility and power to help. A great willingness to do whatever we could, was manifested. The sewing rooms for relief work were filled; over three hundred girls volunteered to do social service work. Had anything like this ever happened before? And out of it all came an evolution, breaking down old barriers, and demanding equality for all. Girls as well as men realized that they were students, and had an equal right in the interests and development of their University.

You may ask "Will this new spirit last?" It is the same spirit with which the United States entered the war. Can we, after the suffering and loss of life caused to uphold it, lose such a

(Continued on page 506)



HOME ECONOMICS Alumnae Record

Miss Lena Bumpas, '17, is State Leader in charge of the County Home Demonstration Agents. She was previously employed in the Home Economics Extension Work of the University.

Miss Treva Kauffman, '10, is Superintendent of Field Work in the Smith-Hughes schools of Ohio.

Miss Mabel Nichol, '17, is in charge of the Rural School Lunch Work of Ohio, carried on under the Extension Department of the University. This position was formerly held by Miss Treva Kauffman.

Miss Henrietta Fromme, '12, is in charge of the Four Year Smith-Hughes Practice School at North High School, Columbus, Ohio. She previously taught in the Home Economics Department of Columbus Public Schools.

Miss Margaret Johnson, '18, has entered a training school for Y. W. C. A. work in New York City. Since her graduation she has been doing government clerical work in Washington, D. C.

Miss Bertha Holtkamp, '18, is engaged in bacteriological work at Camp Jackson, S. C.

Miss Helen Eisele, '19, has returned to complete her work at the University. For the last seven months she was en-

gaged in bacteriological work at the U. S. General Hospital No. 19, at Oteen, N. C.

Miss Agnes Ludman, '18, is attending the Y. W. C. A. Home Economics School at Boston, Mass.

Mr. and Mrs. Walter D. Feller (nee Hanna Good, ex-'18) are living on a farm near Mount Blanchert.

Miss Doris MacCarthy, '18, has charge of the Smith-Hughes Practice School at Reynoldsburg, Ohio. This school gives training to teachers of the two-year course in Smith-Hughes Home Economics Work.

Instructors in the Home Economics Extension Department are: Olgo Ellifritz, '17, formerly assistant in Foods work in the same department; Julia Smith, '17, formerly assistant in the department of Agricultural Chemistry; Edith Dixon, '18; Eloise Davison, '18.

Mr. and Mrs. Martin Morris (nee Mina Rowe, '13) and their two daughters are living at Washington Court House, Ohio.

Miss Dorothy Guy, '16, is teaching Home Economics in the High School at Salem, Ohio.

Miss Rachel Edgar, '18, is a graduate assistant in the Department of Agricultural Chemistry.

START SOIL EXPERIMENTS

Twenty acres of land at the Ohio State University farm have been taken over by the Soils Department for experimental work. The land has been drained with laterals two and one-half rods apart and laid off into one-twentieth acre plots. Around each block of ten plots, there is a twenty-foot permanent roadway of grass.

All the plots with the exception of thirty which are to be used for the clover experiments will be sown to oats this spring. The oat yields on the several plots will be kept separate and measured up to determine the uniformity of the soil in the field.

The most interesting feature of the work at the present time is the clover experiments which are being started on thirty plots this spring. The purpose of these experiments is to determine the relative value of the clovers, alfalfa, and timothy as soil improvers. Three series of ten plots each are used. On each plot of each series a rotation of corn, wheat, and a hay crop—timothy, a clover or alfalfa—will be followed. On one series the hay will be harvested and weighed; on the second, pastured; and on the third, left on the ground and plowed under.

All plots will receive the same treatment of fertilizer. Acid phosphate will be applied at the rate of five hundred pounds per acre every three years, one-half on the corn and one-half on the wheat. This means that each corn and wheat crop will receive acid phosphate at the rate of two hundred and fifty pounds per acre. The corn also will receive an application of two thousand pounds of limestone per acre. So each plot will receive during the rotation acid phosphate at the rate of five hundred pounds per acre and limestone at

the rate of two thousand pounds per acre.

IS THE SEED CORN READY?

Now is the time to make sure that there is a good supply of seed corn on hand. A year ago the seed corn situation was in a critical state. The farm papers and bulletins were insistently urging the farmers to test every ear of seed corn and to make sure that they had an ample supply. This year we do not see such an urgent demand made. The reason is obvious. A year ago the harvesting season was later. In the first place the corn didn't get fully matured. In the second place, the weather was so wet that much of the corn molded in the shock. Then an extreme cold winter followed which absolutely raised havoc with the seed corn, destroying that which was not fully matured and dried, and lowering the vitality of the remainder.

Conditions this season have been different. Nevertheless this should be no reason why farmers should not test their seed corn. Good seed cannot always be detected by its appearance. The checker-board and ragdoll methods are the only tests that are absolutely reliable. It takes but little time to test the year's supply of seed corn and it can be done just as well on a rainy day when other work is not pressing. If you don't believe this method pays, try it and see. Recently I tested five bushels of seed by the checker-board some of the very best appearing ears failed to sprout a single kernel. Just to see whether or not this was a reliable test, I shelled some of the corn from different ears and planted it separately under conditions similar to that of the field. Invariably the tests showed the same results as when tested by the checker-board method.—H. E. W.

What Do These Heaps Mean?

THEY are intended to impress upon you how important a thing the digestibility of feed is. They represent the great difference there is in the digestibility of different feeds.



They compare the milk producing ability of a ton of Buffalo Corn Gluten Feed, 1614 digestible pounds to the ton, with that of a ton of feed low in digestibility.

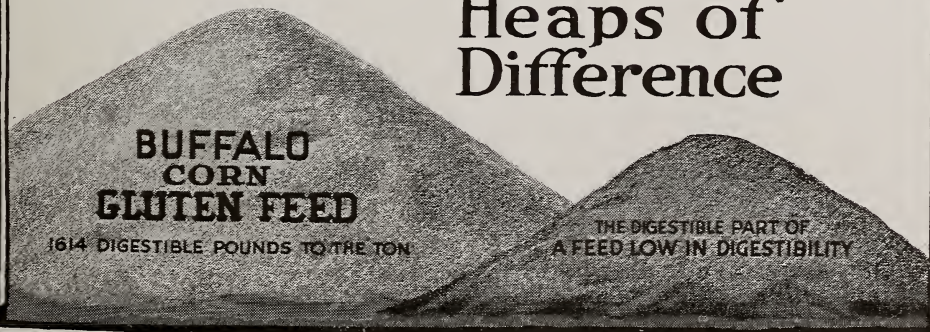
Your cows make milk from only the part of their feed they can digest. Feed Buffalo Corn Gluten Feed and get more milk.

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Heaps of Difference



AGRICULTURAL ENGINEERING

(Continued from page 485)

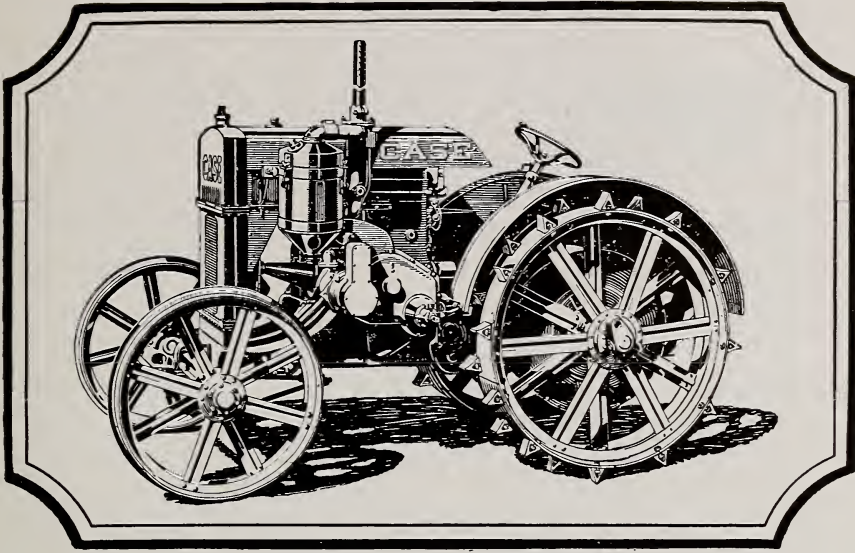
before deciding upon the type of system to be installed.

Drainage, the sixth field of agricultural engineering, might well be placed in the first place in point of importance to the success of the farm enterprise. Our leading soil specialists say it is worse than useless to try to grow crops on undrained or unevenly drained land, and without good crops all farming is a failure. Here is where the civil engineer is going to step in and say that he is the one that is qualified to do this work better than anyone else, but we take issue with him and ask him to respectfully submit to an examination on soil types and characteristics and the water needs of farm crops. True, he will be able to determine the grade that a ditch must have, and possibly he will be able to figure the most economical size of tile to use, but when it comes to the depth and frequency of the drains, will he be prepared to give the correct solution? The farm drainage expert considers, not only the grade, but the water holding capacity of the soil and subsoil, and the most economical arrangement of mains and sub-mains. He studies the movement of the soil water with a view of getting the most efficient distribution of laterals, and finally he makes the system do exactly what it was designed to do, i. e., remove the water evenly and rapidly, thus preventing the drowning of plants and permitting the tillage operations to proceed without delay. It is safe to say that half the tile that are laid without the use of the drainage level and without careful study of the soil water movements are laid too shallow and too far apart to be effective, and that a large percentage of tile laid by the

hand-ditcher and graded by eye, fails to accomplish its purpose because of poor connections at mains, and poorly protected main outlets.

Irrigation is closely allied with drainage and water supply, but so far in Ohio, irrigation has only been employed in a very limited way by the vegetable growers near our large cities, though it is possible that at no very distant date we will see the use of both surface and sub-surface systems in those level parts of the state that have bountiful supplies of water from artesian wells. The addition of ten bushels of corn per acre to the yield in a dry year would pay good interest on a considerable investment in pumping machinery.

In the arrangement of the farmstead and the fields, we should consider the farm in its economic sense as merely an industrial plant in which the raw product, soil fertility, by means of capital invested in it, and in labor and machinery, is transformed into food. A successful manufacturing plant must produce its product with a minimum of lost motion, and great attention is given to the routing of the product thru the factory. On the farm the buildings represent the central manufacturing plant in which raw products are assembled, and from which the finished products are taken to market and wastes returned to the soil. If the farm buildings are laid out in a haphazard way, with no thought of their relation to one another, they will become fruitful sources of waste effort, and once they are laid out and erected, changes are expensive. Of all the branches of agricultural engineering this one has had the least consideration, commensurate with its importance, and it is also the one that requires individual consideration of the farm, as a unit, and hence can only be worked out



A New Case Kerosene Tractor

ABOVE we picture the new Case 10-18, our latest introduction. This, we feel, is the most advanced of all, embodying, as it does, numerous latter-day improvements.

For instance, it is the first offered with a one-piece main frame with a four-cylinder motor mounted cross-wise. All cut steel spur gears, enclosed and run in oil. We could name a dozen new features like these showing the advanced engineering.

This tractor, while rated 10 horsepower on the drawbar, actually develops 13 to 14 horsepower for emergencies. At 10 horsepower it delivers 1,666 pounds pull, more than enough ordinarily for a two-bottom plow going 7 or 8 inches deep. And there is plenty of reserve for the hard pulls.

On the belt it can deliver from 23 to 24 horsepower when necessary. This 10-18

will readily drive a 20x28 Case Thresher with all attachments.

For all kinds of drawbar and belt work, this sturdy little tractor is the most powerful and consistent performer yet built.

All the details are described in our illustrated booklet, which will be sent free, upon request. It will acquaint you with the latest in tractors.

J. I. Case Threshing Machine Company, Inc.

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Write for free circular describing the Model "C" Adapto Tractor which has 900 lbs. draw bar pull, Guaranteed on high gear.

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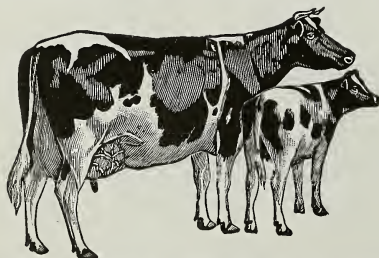
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For Students is Our 38 Page Brochure Entitled "The Holstein-Friesian Cow."

It contains a brief historical outline; remarks on the true type of the breed; results obtained at some agricultural colleges; milk yields; Carlyle's statement on vitality in milk, Holstein milk for babies; Advanced Registry testing, and records of champion cows; semi-official yearly record averages; records made 8 months after calving; list of 200 cows producing four or more pounds of fat per day; lists of cows having records over 100 lbs. fat in 30 days; competitive butter tests at fairs; beef qualifications; Advanced Registry requirements, etc.

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after personal visitation and study on the part of the engineer. It is a matter of simple mathematics to reckon the number of lost steps in doing the chores, but it is a bigger problem to arrange the fields to get the shortest hauls together with the best size of fields to use power machinery and to suit the conditions of rotation. If one is fortunate enough to get an undeveloped farm, he should have a complete design of the farm in all its parts made before beginning to work on any of it. With the farm map as a basis it will be possible to lay out the buildings in order, and to take advantage of all possible points of beauty and elevation.

This leads up to landscape architecture which seeks to make the farmstead a place of beauty. An engineer of knowledge and experience is necessary here for the proper arrangements. Planting is an art itself, the arrangement of trees, shrubs, and flowers to form a picture being the natural gift of but few. The landscape architect makes a study of plant life as well as the lay of the land, effect of climate and type of soil. These are the materials with which he works to bring about what is known as a landscape picture, the effect of which will make a lasting impression on all who pass that way.

It ain't a senseless hoardin'
Nor stinting of our need,
But efficiency in spendin'
That should become our creed.

"What is the relation of the farmer to his business?" asked the professor in a rural economic class.

"He is general manager, also president and secretary," a pupil replied.

"Who is treasurer?" came a question from the rear of the room.

WHAT OTHERS SAY

About the "STUDENT"

The following are a few selections from our circulation files :

From a Farmer :

"I receive much pleasure and profit from the "Student," especially articles from my old Professors.

"I also find great interest in the Alumni news."

L. R. FREDERICK,
Wadsworth, O.

Edwin Bates, Instructor Perry Co.
Model Rural School, Junction City, O.,
says :

"I like to have it on the reading table of the school."

G. F. Aldrich, State Institute speaker, Helena, Ohio, writes :

"I have received the December number of 'The Agricultural Student' and am delighted with its contents. I think you have entered a good field and gathered a lot of good things for your Christmas number."

One from Michigan :

"It may seem strange that an old farmer in Michigan should subscribe to the Student, but I certainly enjoy looking it over and find much of real value in its varied articles. Then it carries memory back to the time of National Corn Shows at the Ohio State."

L. L. LAWRENCE,
Decatur, Mich.

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the Ohio State News?*

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Year \$1.00 With
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Both for \$2.50.

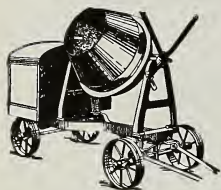
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Concrete Mixers

With or without Power. Built in many sizes. Send for Mixer Catalogue and Book on "How to Make Concrete."

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113 Dublin Ave., Columbus, Ohio.

SELECTING POTATOES FOR SEED

The average farmer selects his seed potatoes from the bin just before planting time. Care taken in this selection is very important. Some farmers use all the potatoes from the bin just as they are shoveled up. Some use only the small potatoes, while others use only the large ones, cutting them into several pieces. Generally each farmer thinks his method is best. But in fact none of these methods are very good.

It has been found that in most cases the big potatoes come from hills having only one or two large potatoes and several small ones. The highest yielding hills are those in which the medium-

sized potatoes are grown. As a rule these hills contain several potatoes of medium size, there being no extra large or small ones. These are the hills that produce the largest quantity and best quality of potatoes. Naturally this goes to show that in selecting seed from the bin, we must choose the medium-sized potatoes that are smooth and of good shape and discard the real large as well as the small ones. These medium-sized potatoes can then be cut into three or four pieces, allowing at least two strong eyes to each piece. A little care taken in the selection of seed potatoes will certainly be worth while.

H. E. W.

MERIDEL FARM DUROCS

The Popular Kind.

MERIDEL FARM, BLACK LICK, OHIO

Where Good Sows and Good Boars Meet

On East Broad Street, 9 Miles East of Columbus.

2 Miles from Black Lick.

3 Miles from Reynoldsburg.



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Full weight—
Galvanized—
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APOLLO-KEYSTONE Galvanized insures durability and satisfaction for all forms of sheet metal work, including Culverts, Tanks, Flumes, Spouting, Garages, etc. Sold by leading metal merchants. KEYSTONE Copper Steel is also unequalled for Roofing Tin Plates. Look for the Keystone added below regular brands. Send for free "Better Buildings" booklet. AMERICAN SHEET AND TIN PLATE COMPANY, Frick Bldg., Pittsburgh, Pa.



OHIO STATE HORSE SHOW

May 3rd, 1919



The Seventh Annual Horse Show under the management of the Saddle and Sirloin Club of Ohio State University will be held Saturday, May 3, on Ohio Field.

There will be classes for all light legged horses, also special feature events.

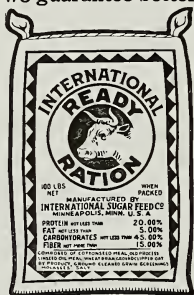
The Horse Show of the Season

Send for Entry Blank and Premium List to
THE AGRICULTURAL STUDENT, Columbus, Ohio.



Complete! Balanced! Ready to Feed!

Here's a better feed than you can mix. It has just the right percentage of protein, fat and carbohydrates. It has been tested and proved and now we guarantee better results than you ever had.



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Banish the fuss, muss and bother of mixing. Do away with the danger of poor quality ingredients, and the risk of shortage of material.

Makes More Milk—Try It!

International Ready Ration will produce more milk from every cow and keep your herd in the best condition. Quality as well as results are guaranteed.

Order a ton today from the nearest International dealer. If he is not conveniently near you, send your request to us.

Manufactured only by

INTERNATIONAL SUGAR FEED CO.
Minneapolis Minnesota

THE NEW SPIRIT

(Continued from page 496)

spirit now? No. We have learned what we can do, and to work together. The time has come here at our University when a mass meeting of girls is not impossible as it was only a few years ago. Gaps which have long yawned wide are closing; the distinction between sorority and non-sorority girls, and town and boarding house girls is gradually disappearing. We are new girls of Ohio State, not perfect nor ever shall be perfect, but awakened to our responsibility of making our University and the world a better and a more noble place. Our men caught this spirit of democracy and cooperation and fought for it "over there"; we found it right here. None of us can afford to forget, but together we must keep on living this spirit of unity and service.

MABEL SCOTT, '19.

CORN VARIETY TEST

Corn variety tests have been conducted at Des Moines, Iowa, under the direction of *Wallace's Farmer* in an attempt to find a variety of Calico, or Blue and White corn that will yield as well as Reid's Yellow Dent and mature in a shorter period of time.

As a result of last year's test, a strain of Blue and White corn which originated in Ohio fifty years ago and which is being grown extensively in Iowa, proved to be superior to Reids'. A yellow capped red strain proved to be almost as good. As far as present tests have gone, these are the only two that have equaled Reid's Yellow Dent.

THE PASTURE

Stockmen are always anxious when a little green grass appears in the spring that they might get their livestock out in pasture and thus save a lot of work. Pasturing too early in the spring is an

Choice Seed Corn

We can supply choice seed at a cost of about 70 cents per acre.

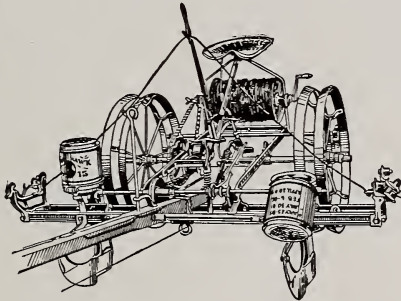
We have a number of varieties, including such popular sorts as **Reid's Yellow Dent, True Yellow Leaming, True Yellow Clarage, Livingston Golden Surprise, Nellers Cattle, Johnson Co. White, Mammoth White Dent, etc. All Crop of 1918.**

Now is the time to again supply your wants with your old, well-tested favorites, that could not be furnished last year owing to the failure of 1917 crops.

Sample grains free. Mention varieties in which you are interested. Catalogue of 96 pages with "True Blue" descriptions tells when to plant and how. Write for it.

Livingston Seed Company
COLUMBUS, OHIO.

**START
RIGHT**



**Use the
Black Hawk**

The reason why some men are more successful than others is because they start right.

One reason why the crops of some farmers grow better and produce more is because they are started right—planted right.

BLACK HAWK PLANTERS are the implements that make these reasons realities. They give the farmer's crops the right start because they plant each seed accurately.

Write us for catalogue and other information.

OLIVER CHILLED PLOW WORKS
PLOWMAKERS FOR THE WORLD COLUMBUS, OHIO

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Cleanliness and Profit

Prof. V. D. Chappel, an eminent authority in dairying has said, "The separator is the cause of more sour cream than any other process through which cream passes." Just as the separator causes sour cream, so also the churn, pasteurizer, milking machine, etc., each in its turn exerts a lowering effect on the quality of the milk product.

Thousands of dairymen are using

Indian in
Circle



In every
Package.

Wyandotte
Cleaner and Cleanser

to eliminate this unnecessary loss of quality through uncleanness, and as a result are receiving higher prices for their milk product.

This highly efficient material thoroughly removes all objectionable matter from the disks, milk and cream spouts, and all small cracks and crevices of the separator as well as from the churns, milking machines, pasteurizers and milk cans, producing that sanitary, wholesome and cleanly condition that is so necessary for a high quality product.

Your supply man will fill your order for this economical and efficient cleaner. It cleans clean.

THE J. B. FORD CO., Wyandotte, Mich.

Sole Manufacturers.

abuse to the pasture and it leads to a future loss. Allow the grass to get a good start and the ground to become dry before putting the stock in the field. If this is done the pasture will keep good all summer. When animals are turned in the pasture early in the spring they pouch the ground and kill out a great deal of the young grass. If the pasture is poor, it can be improved by sowing seeds of a good mixture of forage plants, immediately harrowing with a disc or spike tooth harrow. If barnyard manure can be spared it will serve as a good tonic for the worn-out pasture.

A STRAWBERRY BED

A farm garden, without a strawberry bed in it, is not as efficient as it might be. To most people there is no fruit more delicious than strawberries, either fresh or canned. There is a general

supposition among farmers that it is very difficult to grow strawberries. This accounts for the fact that so few of them grow this delicious fruit. This point, however, is not correct and the farmer who puts out a bed of strawberries this spring and gives it careful attention will find that this crop is no more difficult to grow than a crop of potatoes. Set the plants out this spring in well prepared soil. Plants of a well known variety that have been grown in the neighborhood are the best to use. Set the plants eighteen inches apart in the rows which should be about four feet apart. The plants should be set so that the crowns are about even with the surface of the soil. It is important that the soil be firmly pressed about the roots. Two hundred and fifty plants will be a good number to set out in the farm garden. Several cultivations during the summer are necessary.

NORTHEASTERN OHIO

(Continued from page 470)

who have ascertained the best known methods of soil management and who unreservedly are making use of their application because they realize it pays to do so. They are good farmers and their number is increasing every year. The farm of Mr. Bert McGown in Ash-tabula County is a good example of what may be accomplished by correct investments in soil fertility. Last year acid phosphate was used in such quantity that it averaged two hundred forty pounds for every crop acre (including meadows) on the farm. This is equivalent to nearly one thousand pounds per acre in a four year rotation. Also limestone was applied to one-third of the farm. The initial application was two tons per acre but this is to be reduced to one ton per acre every three years. In addition to these amounts of limestone and phosphorus the farm received its due quota of manure and over one-third of the crop acreage was devoted to clover and alfalfa. This farm is one of those selected as permanent demonstration farms by representatives of the Soils Department of the Ohio State University.

In the future, soil problems no doubt will affect the agriculture of North-eastern Ohio more closely than in the past. As more men enter the third stage of soil management there will be brought about better adaptation of soils to crops. This already has taken place to a considerable extent. Alfalfa is most successful on the better drained sandy areas, the value of sweet clover is recognized on the gravelly soils along the lake, for the wetter soils and those not easily limed, alsike clover is the favorite, and where limestone has been applied in moderate amounts red clover again is occupying the place it deserves.

Give the Chicks a "running start"

Every stage of a chick's development depends upon how it thrives the **first six weeks**. That is the foundation period. Feed from the start for **quick sturdy growth**, and you will get results all the way — early maturity, early laying.

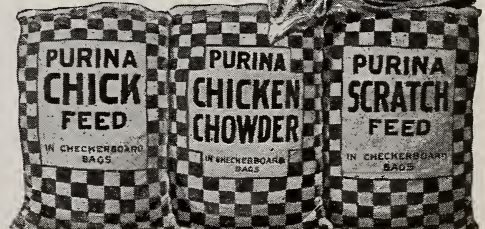
Purina Rations

furnish a chicken the right balance of food elements for every step of the way. Grain feed alone is a poor body-builder—deficient in the proteins that make feathers, blood, nerves and flesh. Purina Chicken Chowder is especially rich in these elements. Combined with Purina Chick Feed it supplies a complete and perfect balance to insure quick and maximum development. Chicks fed on Purina balanced rations, as directed, actually grow **twice** as fast during the first six weeks as chicks fed a grain ration alone. Records prove this, and **we guarantee it**.

Our research department will be glad to furnish further information and interesting data on poultry feeding. Write for our 64-page, 1919 Poultry Book sent free upon request.

PURINA MILLS

Ralston Purina Co., Prop.
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**Highest Winning Butter Is
Colored**

The Rich Golden June Color

—BY—

**CHR. HANSEN'S DANISH
BUTTER COLOR**

The Color that does not affect the Finest Flavor or Aroma of first-class butter.

Chr. Hansen's Laboratory, Inc., are also headquarters for: Rennet extract and Pepsin substitutes for same, Rennet Tablets and Cheese Color Tablets, Liquid Cheese Color, Lactic Ferment Culture, etc.

Chr. Hansen's Laboratory, Inc.,

Little Falls, N. Y.

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Wanted—

Salesmen to sell dairy barn equipment. Experience in selling desirable but not absolutely essential. Experience in dairy farming an asset. Positions in other departments of our business open from time to time. When applying, state age, married or single, references, past experience, in first letter. Address

***James Manufacturing
Company***

Fort Atkinson, Wis.

**INTERESTING FEATURES
IN OHIO'S AGRICULTURE**

The standing of Ohio as an agricultural state is shown by figures recently compiled by the U. S. Department of Agriculture. In livestock production the greatest number of any kind of animals is in the case of swine, 4,668,000 being reported. This places the state fifth in rank and represent six percent of all hogs in the United States. Wyoming, Idaho, New Mexico and Montana lead in sheep production, with Ohio fifth with 2,980,000, or six percent of all the sheep. The 1,030,000 milk cows in Ohio represent $4\frac{1}{2}$ percent of all in the country and place Ohio seventh in rank, Wisconsin being first. Ohio has 891,000 horses, or four percent of all in the United States. This places Ohio in eighth place in horse production. Iowa leads in number of horses and hogs.

Ohio's crops last year were estimated to be worth \$541,000,000, or more than double the average crops of any year for five years before the war. Corn generally comprises thirty-five percent of the wealth in Ohio field crops, hay twenty-one percent, while twelve percent and oats eleven percent.

To give official information on the present and probable future demand for livestock in Europe, is the purpose of a committee of livestock experts appointed by the United States Department of Agriculture to visit Europe in the near future. Professor Mumford of Missouri is on the committee.

Delaine Merino Sheep, B & C Types

The Big Ones Bred for Wool and Mutton

FRANK H. RUSSELL

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647 Neil Ave. Phones: Citz. 4431; M. 6189
Take Neil Ave. car and get off at Poplar Ave.

SPRING TERM CLASSES.

Beginners' Class—Tuesday evening, April 22, 7:30.
Assembly Nights—Monday, Thursday and Saturday.

OAK STREET ACADEMY

827 Oak Street. Phones: Citz. 4431, Main 6189.
Take Oak St. car and get off at Monroe Ave., go east.
Beginners' Class—Wednesday evening, April 23, 7:30.
Afternoon Beginners' Class—Thursday, April 24. 2:30.
OPENING ASSEMBLY—Friday evening, May 2. Dancing 8 to 11. Heber Orchestra.
Tuition—Ladies, per term of 10 lessons, \$4.00; Gentlemen, \$5.00. Private lessons, \$1.00, six for \$5.00. Tuition can be paid \$1.00 per week until paid.
Private lessons afternoon or evening.



The Ohio and Tickletoe

— TAUGHT IN —

EMERSON ACADEMY OF DANCING

Every Monday and Wednesday Evenings at 9:30

Come! Learn the Fascinating Dances

WEEKLY CALENDAR

Advanced Class—Mondays and Wednesdays—7:30
Beginners' Class—Tuesdays and Thursdays—7:30.
Assembly—Fridays and Saturdays—8:15.
Emerson's Six-Piece Orchestra.
Advanced Class—Monday, 3:00.
Beginners' Class—Friday, 3:00.
Juvenile Class—Saturday, 2:00.
Private Lessons by appointment.

As the above calendar will be followed during the entire season all interested in dancing should cut out this page and reserve it for future reference.
For information pertaining to classes or assembly, call the phones given below and all questions will be cheerfully answered.

NORTH 5902—CITZ. 4742
ACADEMY NOW OPEN—ENTER AT ONCE
Margaret Naddy Turkopp

Please mention THE AGRICULTURAL STUDENT when writing advertisers.

VALUE OF ACID PHOSPHATE

(Continued from page 478)

many farms in connection with the phosphate. Most of these demonstrations are now under observation but what few have been made by scattered farmers have brought satisfactory results.

Fifth: It would be hard to estimate the amount of money saved by the farmers buying acid phosphate as compared with other fertilizers but no

doubt it would run into thousands of dollars.

Sixth: Last and I think the most important gain in the use of acid phosphate, is that the farmer has been taught to know what he wanted, and he insist upon getting it. The fact that the farmer in the past has too often depended upon the word and advice of the fertilizer agent in buying his fertilizer is well known, but it is quite certain in the future he is going to know what his crops need most and is going to insist upon getting it.

BLACKWOOD, GREEN & CO.**HARDWARE**

General Hardware and Sheet
Metal — Manufacturers of
Special Laboratory
Apparatus.

624 N. HIGH, COLUMBUS, O.

LIME IN GEAUGA COUNTY

(Continued from page 477)

shows, that on most farms it is a waste of time and money to continue to cultivate the fields without applying limestone. On these soils, naturally deficient in calcium, the best crops do not seem to be possible without an addition of limestone with the manure and fertilizer.

It has been a surprise to notice the marked effect of even a limited application of limestone. One thousand pounds per acre has made a good clover crop instead of a complete failure on many farms. One ton per acre in each four-year rotation is often used by our best farmers, although an extra increase is shown from larger applications. Hauling three to ten miles is the limiting factor. At least in normal times even our dairy farmers cannot make the most profit without a plan of operation that includes the use of limestone.

Arsenate of lead is one of the best bug killers. It is very poisonous, sticks well, and does not burn the foliage.

Potato Wart, a new and dangerous disease, has appeared in Pennsylvania from Europe.

The
**Bucher Engraving
Co.**

Columbus, Ohio.

**Drawings and Illustrations
for All Uses**

**Printing Plates Made From Your
Own Photographs or
Drawings.**

"STATE" JEWELRY

Anticipating the Holiday Season which is just around the corner, we're showing many interesting, attractive and useful things especially designed for gift purposes.

PILLOWS in pelt and leather, PENNANTS and BANNERS

At prices that are sufficiently varied to meet every one's requirements.

THE H. K. SMITH CO., 11th Avenue & High

Marzetti Restaurant

We Serve Only the Best.

WE BAKE OUR OWN PIES

TENTH AVE. AND HIGH ST.

IF YOU HAVE YOUR PHOTO MADE BY

THE OLD
RELIABLE

Baker Art Gallery
COLUMBUS, O.

STATE and
HIGH STS.

IT WILL ALWAYS BE BETTER.

Our photos are the most durable. We excel in the large variety of
Exclusive Styles and Artistic Finish.

SPECIAL RATES TO ALL UNIVERSITY STUDENTS.

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CONFECTIONERY

The one place around
the campus where you
can get good things to
eat and drink.

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COLUMBUS, OHIO.

THREE NEW World's Champion Records—and

Where
Secretary
Conditions
Prevail

ARDEN FARMS, Inc.
St. Paul, Minn.

PURE
BRED
HOLSTEIN
FRIESIAN

The Quaker Oats Co., Chicago, Ill.

We have been feeding SCHUMACHER FEED to the two new World's Champion heifers, JEWEL PONTIAC SEGIS and BEAUTY BEETS WALKER SEGIS, for some time and are pleased with the results. We also enclose herewith a circular showing the World's Records made by BEAUTY GIRL PONTIAC SEGIS another of our young heifers that has broken twenty records in all. I am pleased to advise that she was also fed on SCHUMACHER FEED.

Yours very truly,

J. M. HACKNEY

"The proof of the pudding is in the eating." Results are what count and results are what you want from your dairy cows. When we tell you that SCHUMACHER FEED is the greatest result producing carbohydrate or maintenance dairy ration, the assertion is backed up by facts as per above letter from Senator Hackney — facts that are indisputable. When 32 World's Champion Cows have made their world's records while fed SCHUMACHER FEED as a carbohydrate part of their ration, it will also prove best for *your* cows.

Schumacher Feed and Big "Q" Dairy Ration

fed in combination make the ideal dairy ration for long time milk production. SCHUMACHER FEED—the world's greatest carbohydrate ration supplies the dairy cow with vitality and reserve energy to "stand up" under long distance production. It keeps cows "on their feed"—its palatability and high digestibility and sufficient bulk induces cows to eat heartily.

BIG "Q" DAIRY RATION is first, last and all the time a QUALITY protein ration—a wonderful milk producer. With SCHUMACHER as a maintenance part of the ration and BIG "Q" as the milk producing part of the ration you are assured maximum milk production over long milking periods.

Give these
Feeds a TRIAL

The Quaker Oats Company

Get These Feeds
From Your Dealer

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CHICAGO
U. S. A.

Jewel Pontiac Segis

World's Champion Sr.
3-Year-Old Holstein
In 365 days produced 1171.15 lbs.
Butter and 27065.5 lbs. Milk.

Beauty Beets Walker Segis

World's Champion Sr.
2-Yr.-Old Holstein.
In 365 days produced
1060.64 lbs. Butter and
25362.20 lbs. Milk.
This heifer broke 20
world's records.

Beauty Girl Pontiac Segis

of Arden Farms, Inc.
World's Champion Jr. 3-Yr.
Old Holstein-Friesian
At age of 3 yrs., 2 months
and 7 days produced 1112.51 lbs.
Butter and 24924.70 lbs. Milk.

114-S

SAVE

~~\$10⁰⁰ TO \$15⁰⁰~~
~~\$20⁰⁰ TO \$30⁰⁰~~
per cow per year
with a
DE LAVAL
CREAM SEPARATOR

Formerly, with butter-fat at 25 to 35 cents a pound, a De Laval Cream Separator saved \$10 to \$15 per cow per year over gravity skimming.

Now with butter-fat selling at 50 to 60 cents a pound, and even higher, the saving with a De Laval is doubled.

If you have only two cows and are selling cream or making butter, a De Laval will soon save enough to pay for itself.

With butter-fat at present prices you need a De Laval more than ever before, and if you already have an inferior or half-worn-out separator, your cream loss with such a machine is too big to be neglected.

The best cream separator you can get is the only machine you can afford to use these days, and creamerymen, dairy authorities and the 2,325,000 De Laval users all agree that the De Laval is the world's greatest cream saver. They know from experience that the De Laval skims the closest, lasts the longest and gives the best service.



Order your De Laval now and let it begin saving cream for you right away. See the local De Laval agent, or, if you don't know him, write to the nearest De Laval office as below

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OVER 2,325,000 DE LAVALS IN DAILY USE

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